PACIFIC MARINE REVIEW

JANUARY 1940

U. S. MARITIME COMMISSION WEST COAST SHIPBUILDING *Program*

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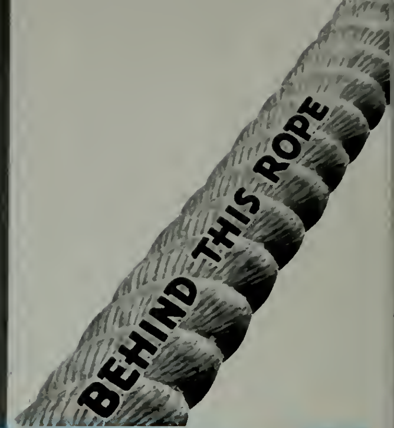

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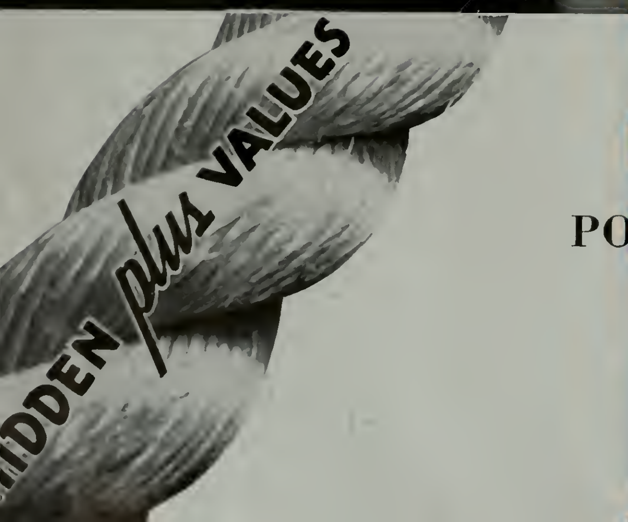

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COMPANY

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

Contents - January, 1940

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No. 1

PACIFIC MARINE REVIEW

JANUARY
1940

Prospect and Retrospect

Entering 1940, PACIFIC MARINE REVIEW tenders to all readers its best wishes for a happy and prosperous New Year.

This is the beginning of our 37th year of service to the Pacific American merchant marine. During these almost four decades, both the merchant marine and ourselves have grown to a stature that would hardly have been predictable from that small one-room office on a Seattle waterfront pier in 1904.

A certain great poet-philosopher once said, "I looked behind to find my past, and lo! it had gone before." Taking this quotation as a basis for our prospective thinking in this first month of 1940, we of the Pacific Coast may well take courage and go on to greater achievements in the decades ahead.

There have been many occasions during the past forty years when men of experience in merchant marine affairs looked with despair on the future of the Pacific American merchant marine; when labor troubles, foreign competition and natural catastrophes have had us down and almost out. Yet here we are at the beginning of 1940, stronger, more virile and more eagerly looking forward than at any other period during this century.

As we look over the world today, we are impressed with the fact that the United States is the only nation possessing a large merchant fleet that is entirely free to develop new commercial connections in international trade. This is a great opportunity, and many of our ship operators are already taking advantage thereof.

There is also an opportunity just now to sell old and laid-up tonnage advantageously. Every nation at war needs ships for many purposes, and is willing to pay far more than scrap value for old hulls. This opportunity also is being embraced by many shipowners.

Shipbuilding on the Pacific Coast has now a good start, with contracts for twenty-three fine cargo vessels. All indications point to a ten- to fifteen-year period of great activity in American shipbuilding. Actual commercial construction and contracts in American yards on January 1 is well over a million gross tons. This is the greatest total we have ever had, except in the war-construction period under the United States Shipping Board. That this total annual construction will probably remain at approximately this level for several years ahead, and then taper off very gradually, if at all, should be a most happy New Year prospect for the Pacific Coast shipbuilder.

To The Merchant Marine Personnel

During recent months you have engaged in a long series of acts of bravery. Indifferent to personal safety in the face of others' distress, you have saved more than 800 lives at sea. In extending Christmas greetings to you, it seems to me that these stirring examples of man's humanity to man should be emphasized. The hope is expressed that during coming months more and more men in all countries may be animated by such unselfish impulses to the end that another Christmas may not make a mockery of peace on earth, good will toward men.

E. S. LAND,
Chairman
United States Maritime Commission

ADMIRAL EMORY S. LAND
Chairman, U. S. Maritime Commission

The United States Maritime Com West Coast

All Federal bureaus, and particularly those dealing directly with American industries, are subject to sectional pressure and to accusation of sectional favoritism. In this the Maritime Commission has been no exception. Unlike its predecessor, the U. S. Shipping Board, there was no provision made for sectional representation in the creating act, nor at the time of this act was there existing any international emergency requiring great haste in ship construction.

The President took plenty of time before appointing a permanent Commission, and the Commission took plenty of time to study the problems connected with the construction of a new fleet. When a definite program of replacement had been decided, the Commission proceeded cautiously to sound out the possible operators of these ships with tentative standard designs for several types of cargo and passenger-cargo vessels. Then bids were called from shipyards, and contracts let with great care. The Commission was feeling its way into the program, and soon the shipyards of the Atlantic Coast began to hum with activity.

Steps by which this actual construction was approached are interesting, as developed in the following sketchy account of the history of the Commission and of its Technical Division.

Origin of Commission

The United States Maritime Commission was created under the Merchant Marine Act, 1936, "to further the development and maintenance of an adequate and well-balanced American merchant marine, to promote the commerce of the United States, to aid in the national defense, to repeal certain former legislation, and for other purposes."

Shortly after President Roosevelt signed the Act, he appointed a temporary three-man Commission, consisting of Admiral Henry A. Wiley, chairman, Admiral Montgomery Taylor, and George Landick, Jr. This Commission organized the Martime Commission and took over the work of the former United States Shipping Board Bureau, in accordance with the provisions of the Act.

Early in 1937 the president appointed the members of the permanent Maritime Commission, consisting of five men, as provided for in the Act. Joseph P. Kennedy was appointed chairman, and Admiral Emory S. Land, Admiral Henry A. Wiley,

JAMES L. BATES
Dir., Tech. Div., U. S. Maritime Commission

A distinguished riveting gang drove the first rivet at keel laying of first ship in Maritime Commission's Pacific Coast shipbuilding program at Moore Dry Dock Co. yard, March 18, 1939. Left to right, David Currier, chief inspector, Maritime Commission; H. E. Frick, operating manager, American President Lines; Reginald Laughlin, general counsel, American President Lines; and E. C. Mausshardt, Pacific Coast operating manager, U. S. Maritime Commission.

mission's Shipbuilding *Program*

COMDR. H. L. VICKERY (C.C.)
Senior Asst. to Chairman, U.S. Maritime Com.

Thomas M. Woodward and E. C. Moran, Jr., commissioners. Later, Mr. Kennedy was appointed United States ambassador to Great Britain, and Admiral Land succeeded him as chairman. Max O'Rell Truitt, who had been general counsel of the Commission, was selected by the President as commissioner, to fill the vacancy caused by Mr. Kennedy's resignation.

Shipping Survey

The first major act of the Commission was to determine, by a survey of the shipping situation, the types and kinds of ships required to replace the existing tonnage. As a result, the Commission established a definite program to build 500 ships within a period of ten years.

Admiral Land, late in 1937, following his appointment as chairman, selected Commander Howard L. Vickery (CC), U. S. N., at that time on duty as head of the War Plans Unit in the Bureau of Construction and Repair, Navy Department, to come to the Commission as his senior assistant for the purpose of organizing a technical division.

Upon his arrival at the Commission, Commander Vickery found that the technical work was being performed by W. G. Esmond, naval architect, and J. E. Schmeltzer, marine engineer, with only three assistants.

Under Commander Vickery's direction a Technical Division was set up, with James L. Bates (formerly in charge of Preliminary Design, Bureau of Construction and Repair, Navy Department) as director, and J. E. Schmeltzer as assistant director and chief engineer. Various sections were formed, as follows:

Hull Plan Approval & Scientific Section—Headed by W. G. Esmond.

Engineering Plan Approval Section—Headed by A. C. Rohn.

Engineering, Scientific, Preliminary Design & Specifications Section—Headed by C. W. Flesher.

Hull Final Design Section—Headed by P. B. Brill.

Construction Section — Headed by L. R. Sanford.

Performance Section — Headed by W. E. Thau.

Materials Section—Headed by E. L. Lasier.

Hull Preliminary Design Branch—Headed by I. J. Wanless.

Clerical Section—Headed by B. F. Carter.

The first important act of the Commission affecting the Technical Division was the signing of a contract with the Newport News Shipbuilding & Dry Dock Co. of Newport News, Virginia, for the building of the S.S. America. Immediately following this was the contract with the Standard Oil Company of New Jersey for twelve twin-screw naval defense tankers.

The Technical Division in the meantime was preparing designs for its C-2 type cargo vessels, on which the first bids were received February 1, 1938.

Tremendous Work Done

Since the Technical Division was organized, contracts have been awarded covering a total of 141 vessels, of which 111 have been to the Commission's own designs and 30 to designs prepared by private naval architects. The designs of private naval architects are examined and approved by the Technical Division before contracts for construction of the vessels can be started. All of the working plans of the Commission's C-1, C-2, and C-3 type vessels are examined and approved before any construction work is done. The Construction Section of the Technical Division has inspectors at the various shipyards for the purpose of inspecting and checking on the construction work being done there for the Commission.

Materials entering into the ship construction are prescribed and tested by the Materials Section of the Division.

J. E. SCHMELTZER
Asst. Dir., Tech. Div., U. S. Maritime Com.

The Technical Division of the

G. H. EASTON
Dir., Trial Boards, U. S. Maritime Com.

W. G. ESMOND
Chief, Hull Plan App. & Scientific Sec., USMC

P. B. BRILL
Chief, Hull Final Design Section, USMC

The Clerical Section handles all the plans and correspondence of the Technical Division, and some idea of the volume of the work of this section may be gathered from the fact that the Technical Division acts on over 2,000 working detail plans per month.

The Performance Section is charged with the responsibility of seeing that the ship and its machinery functions as the Technical Division intended it should, and to gather professional data for the improvement of future designs.

Work performed by the Technical Division is tremendous. During the two years of its existence, the experts connected with this department have developed preliminary and final plans for: nine types of cargo carriers; two types of cargo-passenger vessels; and one type of large transpacific passenger liner. In addition to this development work, the Division has: checked carefully many proposed design plans for private owners; tested all materials going into construction of some 141 ships; held performance trials on some 21 vessels; and checked working detail drawings on all of these vessels.

When we consider the volume and the character of this work, and realize that it has been done so carefully that every ship so far tested has exceeded the calculated speed on normal shaft horsepower, and that one type has produced a world record on fuel economy, we must salute the Technical Division of the U. S. Maritime Commission for its splendid achievement.

Pacific Coast Program

Much criticism has been directed at the Maritime Commission and its Technical Division for alleged failure to recognize the existence of the shipbuilding industry on the Pacific Coast. Much political pressure has been applied and publicity exerted to force some of the shipbuilding effort to the Western seaboard. The Technical Division has never, so far as we are

Artist's conception of C-3 type cargo steamer, four of which are now building at Moore Dry Dock Co.

U. S. Maritime Commission —

ARTHUR C. ROHN
Chief, Eng. Plan Approval Sec., USMC

C. W. FLESHER
Chief, Eng. Scientific & Spec. Section, USMC

L. R. SANFORD
Chief, Construction Section, USMC

aware, taken any trouble to answer these criticisms. Since *Pacific Marine Review* has somewhat participated as a critic, we are now going to appeal to the record, which shows that the Commission has been quite impartial in the matter of contracts.

First of the series of 141 ships that comprise the fleet constructed, under construction, or under contract to date, is the U. S. Lines' steamer America, authorized by contract dated October 21, 1937.

Next bit of work appearing on the record is the 12 national-defense feature tankers ordered through Standard Oil Company of New Jersey. These bear the date January 3, 1938.

Then comes a group of C-2 type cargo vessels contracted in May and June, 1938, followed by a group of C-3 type in November and December, 1938, and in January, 1939. The January, 1939, contract was for two C-3 cargo carriers to be built by the Moore Dry Dock Company of Oakland. The first of these vessels at Moore's yard is Hull Number 51 on the Maritime Commission books.

Since no shipyard on the Pacific Coast was ready to undertake the America or the twelve tankers, and since six of the rest of the fifty-one hulls were built for private ship operating firms who sat in on awards, it is apparent that there were thirty vessels awarded to Atlantic Coast yards before the first Pacific Coast award.

As we look back now on the great deluge of oratory and publicity on this matter, it seems as if there must have been hundreds of contracts given to Eastern yards, and that these yards must have been busy for years before we of the West Coast were even thought of by the Commission. Yet there is the record in cold figures; thirty vessels contracted for and a nine-months' period of time from the first Atlantic Coast job to the first Pacific Coast contract.

The first contract, at the end of a little more than a year after the Technical Division began to function, put Pacific Coast yards in the position of having 6 per cent of the work authorized by the Commission which Pacific Coast yards could have handled.

Accelerating Contract Rate

Since January, 1939, the rate of contracting has accelerated considerably. Then numbering 51 total, they now number 141. Contracts for 50 vessels were let during 1938; contracts for 90 vessels were let during 1939. Of these 90 contracts, the shipbuilding yards of the Pacific Coast received contracts for 21 vessels, or approximately 23 per cent of the total. This is a very encouraging increase in the proportion of ships allotted to our West Coast yards, and it encourages us to believe that we shall have more of this program in the future.

The satisfactory progress now being made on present contracts is giving the Maritime Commission a healthy respect for the ability of Pacific Coast shipbuilders, and will undoubtedly lead to larger commitments in the future.

Pacific Coast Contracts

Summing up the Commission's shipbuilding contracts at present in force in Pacific Coast yards, we have:

(1) *The Moore Dry Dock Company,* Oakland, California. This firm leads the list in tonnage value and prior date of first contract with four C-3 type cargo vessels allotted to the American President Lines' round-the-world service. These vessels have a total loaded displacement tonnage of 70,400, and a total contract value of $11,221,520.

(2) *Bethlehem Steel Company, Shipbuilding Division, Union Plant,* San Francisco, California. This oldest of Pacific Coast steel shipbuilding plants (the old Union Iron Works) has five C-1 type, steam turbine drive, full scantling ships not yet allotted to any ship operator. The five vessels total 64,375 tons loaded displacement and $10,010,000 contract cost.

(3) *Consolidated Steel Corporation,* Los Angeles, Calif., a well-known and experienced steel fabrication firm, has four C-1 type, turbine drive, full scantling ships. The four ships will total 51,500 tons loaded displacement and $7,560,000 contract cost.

(4) *Seattle-Tacoma Shipbuilding Corporation,* Seattle, Washington, is combining the Todd Shipyard at Tacoma with the outfitting docks and

The Technical Division of the

E. E. MARTINSKY
Asst. Chief, Hull Plan Ap. & Scien. Sec., USMC

I. J. WANLESS
Head, Prelim. Design Branch, USMC

EMERY L. LASIER
Chief, Materials Section, USMC

shops of the Todd Dry Docks at Seattle. This firm has five C-1 type, diesel drive, full scantling cargo vessels, with a total displacement tonnage of 64,375 and a total contract cost of $10,635,000.

(5) *Western Pipe and Steel Company*, San Francisco, Calif., operates a large fabricating plant at South San Francisco adjacent to a large basin having four side-launching ways. Here many barges and dredge hulls have been built in recent years and many seagoing ships during the former war shipbuilding program. This firm has five C-1 type, diesel drive, full scantling cargo carriers, with a total displacement of 64,375 tons and a total contract cost of $10,635,000.

Widespread Benefits

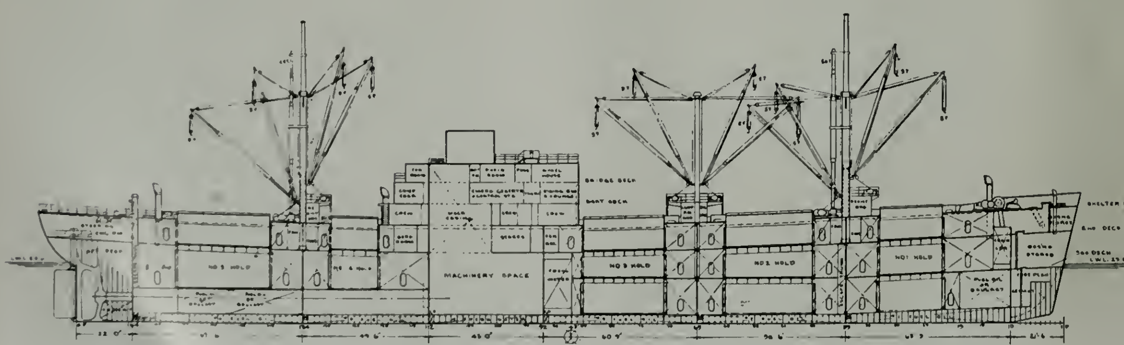
The 23 vessels of this program will aggregate 315,025 displacement tonnage and a value of $50,061,520. They will use: approximately 60,000 tons of ship steel; 14,400 tons of propulsion machinery and engine room auxiliaries; and 18,250 tons of equipment rigging, deck machinery, wiring, piping and other items. The total weight of the material and equipment worked into these vessels will be 95,920 tons.

This material and equipment will come from all parts of the United States. Much of it will be produced and manufactured on the Pacific Coast, but in the total, nearly every state in the Union will be represented, and in its transportation nearly every American freight transporting method and firm will have had a share.

Additional Plans

The Commission has under way the plans and specifications for several new designs, including passenger and cargo ships and tankers. One design which is exciting a great amount of interest at present is the new liner for the transpacific trade of the American President Lines, on which the Commission expects to ask for bids on January 15, 1940. This vessel will be the largest and speediest merchant vessel ever designed and built in the United States, and will contain many novel features of design.

The Technical Division has grown



Inboard profile, C-1 type full scantling cargo vessel. Nineteen of this type are on order in Pacific Coast shipyards.

U. S. Maritime Commission —

A. DE BOUTHILLIER
Chief, Interiors & Styling Unit, USMC

W. E. THAU
Chief, Performance Section, USMC

JAMES T. GALLAGHER
Asst. Chief, Construction Section, USMC

considerably since Commander Vickery organized it in 1937. In comparison to five employees then, it now has some 233 employees on its rolls outside of the field force, but at that is very much undermanned, considering the amount of work it has in prospect and in project. Its personnel, however, is young and enthusiastic, and applies itself in a manner that has resulted in meeting all schedules on the appointed time.

The Commission has not hesitated to pioneer in many directions, and has attempted in its designs to take advantage of all the progressive steps in modern engineering. At present its designs call for steamships having steam characteristics of 450 lb. gage pressure and 750° F. total temperature; 1200 lb. gage pressure and 950° F. total temperature; and 1200 lb. gage pressure and 750° F. total temperature (regenerative reheat cycle). In addition, there are direct-drive diesels, two-engine-geared diesels, and four-engine-geared diesels, with horsepowers ranging from 4,000 S.H.P. to 80,000 S.H.P.

The designs of the Commission's ships, up to the present, have resulted in ships whose performance in every way has been most gratifying. The results obtained are due to good design generally, both in hull form and machinery.

We salute the Technical Division of the United States Maritime Commission, and congratulate them on their great accomplishment.

S. S. Seakay, one of the 12 national-defense feature fast tankers built or building under the U. S. Maritime Commission.

A. S. Gunn, general manager.

UNION PLANT, *Bethlehem Shipbuilding*

Pioneer Pacific Coast

Executives of Bethlehem Union Plant

E. F. Essner, general superintendent, Union Yard.

W. M. Laughton, assistant general manager.

J. T. Greany, manager of sales.

Arthur Forster, assistant general superintendent, Union Yard.

F. McLeod, general superintendent, Alameda Yard.

T. B. Forster, general superintendent, Los Angeles Yard.

Division of Steel Company, Inc.

Yard to Build Five C-Is

The Union Plant of Bethlehem is the pioneer steel shipbuilding plant of the Pacific Coast. As the Union Iron Works, its history in the design and building of heavy machinery runs back to the good old days of '49. It began to be a steel shipbuilding plant at its present site in 1881, and for nearly twenty years was the only steel shipbuilding yard on the Pacific Coast of North America. We doubt if there is another plant in the United States today that has a continuous history of 59 years building steel vessels.

During these ten decades, this plant built and equipped some 336 hulls. First of these, the Arago, was a small coastwise freighter, delivered in 1884. The list since includes many fine cargo vessels, passenger liners, tankers, destroyers, coast defense vessels, cruisers, submarines, gunboats and battleships.

At the peak of the Shipping Board war-time effort the Union Plant was working 35,000 men. During its first two decades, this plant was the great training school of the Pacific Coast for shipyard and shop workers, marine engineers and naval architects. In those days practically everything that went into the ship was designed and built at this plant. Practically every ship that was delivered took out graduate apprentices as oilers, wipers or firemen, and these boys soon began to: pass their exams; get their tickets; and become marine operating engineers. Many a veteran American merchant marine chief, many a world-famous naval architect and many a professor of engineering got his initial inspiration at the old Union Iron Works.

Today, as the illustrations show, this plant has been thoroughly modernized to adapt it to the new technique in hull fabrication and assembly. A complete description of this reconditioning was published in Pacific Marine Review for October, 1938.

The Union Plant includes not only the Potrero Works (old Union Iron Works) but also the Hunter's Point graving dock, the Alameda Works and the repair yard and docks at East San Pedro, Los Angeles harbor. It is thus the most extensive and complete shipbuilding and ship repair plant on the West Coast.

A. S. Gunn, general manager of the Union Plant, joined the Union Iron Works as a shipfitter's helper in 1893. When the Risdon Iron Works, another pioneer San Francisco firm, decided to enter shipbuilding in 1901, Mr. Gunn went to this new yard as foreman shipfitter. In 1911, when the new yard was absorbed by Bethlehem, he came back with it and was soon promoted assistant general manager under the late great Joseph Tynan. When Mr. Tynan retired in 1933, A. S. Gunn became general manager of the Union Plant.

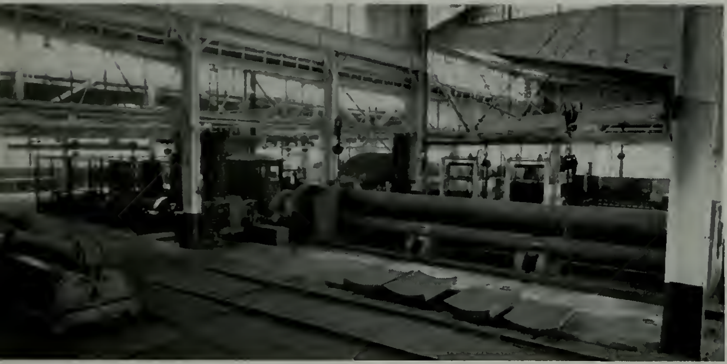
Here, again, we have a unique situation among American shipyards. Very few yards can boast a chief executive who has come right up from the bottom in the plant of which he is manager. Mr. Gunn knows intimately every phase of shipbuilding. From practical experience he knows the problems confronting every one of his key executives, and is thus in a position to intelligently direct the policy and appraise the effect in any given situation.

The Shipyard

All structures, crane ways and industrial trackage in the shipyard are so located that the material in process of fabrication moves through the vari-

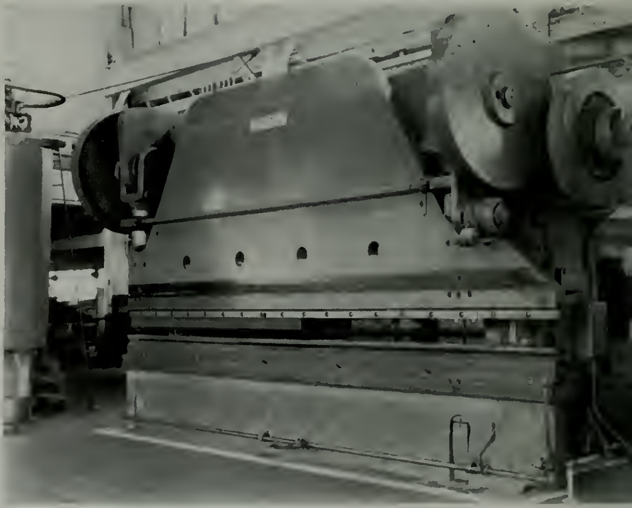
Bird's-eye view of the San Francisco Yard of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company, Inc. Center foreground shows plate shop, welding racks and ship erection ways.

Facilities at Union Plant of Bethlehem



Above, the plate yard and crane, the plate shop and mold loft across the inshore end of shipbuilding ways. At left, large plate bending rolls; and below, new large press brake; both in plate shop. These two tools are said to be the largest of their type on the Pacific Coast.

Below, two views in the machine shop, featuring large special planers, boring mills, drill presses and lathes. This shop is notable for the lavish provision of overhead traveling cranes of large capacity.



ous shops in natural sequence and in as close to a straight line movement as possible.

This is true of the line from steel plate and shape storage racks through the plate shop, and sub-assembly spaces to the building ways. It is also true of movement of material and equipment through either the machine shop, the forge shop, the mill-pattern-joiner shop, or the pipe and copper shop to either the building ways or the outfitting docks.

Material Handling

All railroad track curves are carefully lined up and the curvatures reduced to a minimum inside radius of 120 feet. All dock and yard surfaces are graded level and surfaced with a bituminous macadam pavement. For surface movement of materials, a fleet of gasoline drive tractors is used with special trailers built to Bethlehem design and specifications. The axles of these trailers run in roller bearings and the wheels are fitted with puncture proof pneumatic tires. Each trailer is designed for a load of 4,000 pounds, will take 5,000 pounds safely, and so loaded can easily be pushed along a level pavement by one man.

Each of the three shipbuilding ways is served by two 15-ton capacity overhead cranes traveling on elevated runways. By an ingenious use of 3 equalizer girders four cranes can be hitched together and will handle 40 tons to any part of the 3 ways. The elevated runways carrying the cranes have a length of 420 feet and a width of 86 feet between centers of runways. Vessels 500 feet overall length and 65 foot beam could be built here. For heavier weights there is a 100-ton sheer legs at the outfitting basin.

Power Distribution

In order to make this yard independent a complete steam power plant has been installed in a separate power house. Two water tube boilers are used, each having a rated capacity of 350 horsepower and each being capable of continuous operation under a load of 700 horsepower. These boilers are equipped with Bethlehem-Dahl combination gas and oil burners fitted with automatic firing control. Normally the burners use natural gas. If for any reason natural gas supply fails, the burners can be changed over to oil fuel in a few minutes.

Three air compressors with a combined capacity of 1700 cubic feet of free air per minute are installed in this new power house.

In order to facilitate connection, inspection, maintenance, and repairs, a pipe trench of reinforced concrete was installed in a loop encircling the entire yard. The various pipe lines, including fresh and salt water, hydraulic service, pneumatic service, natural gas and fuel oil services, are carried on hangers on each side of this trench.

Electric power is distributed through panels of the large 440-volt sizes, with several features of special design for this installation.

Artificial lighting for the entire plant is by lighting fixtures of the Holophane Prismatic Reflector type. These fixtures are installed in sufficient quantity to give practical daylight illumination over every part of the floors in all shops, with elimination of all objectionable shadows.

Ample overhead crane capacity is installed and in each shop the storage of raw materials is adjacent to the shop and arranged so that materials may be handled into the shop and to each tool by the system of overhead cranes.

Notable in this respect is the large new forge shop. Here the overhead cranes run right out over the bloom storage yards and deliver the blooms direct to the furnaces.

Recognition of the trend toward welding in ship hull assembly is evident in the rearrangement of the Union Plant. Regulations now require that all welders employed on either naval or merchant marine construction shall be certified by the Navy Department or the Department of Commerce. In order to create a supply of such qualified welders a welding school was started at the Potrero Works several years ago.

The large welding slab of heavy steel channel construction is located on the west side of the building ways with ample room for sub-assembly and is served by the elevated crane ways alongside the ways.

There are nine 1,000-ampere, 65-volt, multiple operator welding generator sets installed. The entire shipbuilding way superstructure is wired for conveniently-located outlets, where portable resistor reactor houses may be plugged in to serve welders on the job. Seventy-five of these portable resistor reactor houses are kept in good working condition. Each generator set will supply power to 15 welders.

At the Union Plant, the plate shop follows the usual practice as to location and arrangement, lying across the inshore end of the building slips and being of two-story construction, with the mold loft and scrive board on the upper floor.

In the trend toward welded in place of riveted joints in ships' hulls, punching machines are becoming less important and the plate planers more important as plate shop tools.

Hydraulic power is used considerably in this shop, and the hydraulic pumps and accumulator are therefore located in the shop so as to have the advantage of short high-pressure lines. All furnaces in this shop use natural gas firing.

Notable among the tools recently installed is the huge press brake. This tool, with a die length of 18'-8" and a die stroke of 4 inches, has a pressure rating of 900 tons maximum. On actual tests it has bent ⅝" mild steel 14 feet long to an inside radius of 1 inch on a pressure of 450 tons.

Another new and very useful tool is the Travograph with attachments. This machine is for flame cutting automatically to template.

Notable among the new tools in the new forge and blacksmith shop are the new bar shear and the two new pneumatic, electric motor drive, self-contained hammers. Two new box type heat treating furnaces in this shop are interesting. The large annealing furnace has capacity to take the largest and longest line or tail shaft sections. Its length may be divided in 3 by two portable partitions and the gas firing arrangement and control is such that any one of the sections may be used without heating the others or all may be used simultaneously with differing temperature ranges under perfect control. These furnaces were built by Bethlehem.

Thus it will be seen that the San Francisco Yard of the Union Plant of the Shipbuilding Division of Bethlehem Steel Company, Inc., is ready to build and equip ships of the C-1 type, and to take care of machinery installation on ships of larger sizes, the hulls of which could be erected at the Alameda Yard.

D. G. Henderson, president

A Revival of In Southern

CONSOLIDATED STEEL CONTRACTS TO BUILD

Three Executives of Consolidated Steel

Alden G. Roach, vice president in charge of Shipbuilding Division

Shipbuilding California Yards

Main gateway at Consolidated plant, Los Angeles

CORPORATION LTD. FOUR C-I CARGO VESSELS

Consolidated Steel Corporation, Ltd., of Los Angeles, California, have contracted to build four C-I cargo vessels for the United States Maritime Commission, and are well advanced on the prosecuting of engineering and construction work preparatory to the actual fabrication and assembly of the vessels.

The hull and engineering drawings are being prepared by George Sharp, consulting ship designer, of New York City, under the direct supervision of W. E. Spofford, retained by Consolidated as naval architect, and Captain Harry B. Hird, retained as chief engineer.

Fabrication of the steel for the ships will be performed at the Los Angeles fabricating plant, and the fabricated steel will be hauled by truck and rail twelve miles to the Craig yard at Long Beach for assembly. Prior to bidding, arrangements were made with the Craig Shipbuilding Company to lease their ways, sufficient property and outfitting dock for assembling, launching and outfitting the ships. Similar to other recent shipbuilding operations, as much prefabrication as is possible will be done at the fabricating plant and at the ways prior to assembly. At present, the ways at the Craig yards are being rehabilitated to accommodate construction of the vessels under contract. These ways are side launching ways, which, during the last European conflict, were used for the construction of submarines for the United States Navy and 8,000-ton cargo boats for the United States Shipping Board. Since then the yard has launched many fine yachts, ferries and coastwise freight and passenger steamers. The ways at present are serviced by a ten-ton express gantry crane completely spanning the ways. In addition to this crane, there is being installed a new forty-five-ton American Hoist Revolving Gantry Crane to handle the heavy welded prefabricated assemblies. A mold loft building 70 by 280 ft. has been constructed at Consolidated's fabrication plant in Los Angeles.

Lloyd Earl, vice president, in charge of production

Shipbuilding Division Formed

The executive management of the shipbuilding division is being handled by the present executives of the company. Many of the operations in connection with the shipbuilding project are so closely related to the present activities of the company that it has always been the intention of the management to absorb this new venture into the rest of the operations as intimately as possible. Accordingly, no subsidiary company was formed; merely a new division was set up in a manner similar to other divisions of the company, such as structural, plate, mechanical, reinforcing steel and light shop divisions. However, the shipbuilding division has been strongly augmented by a number of men outstanding in the field of shipbuilding.

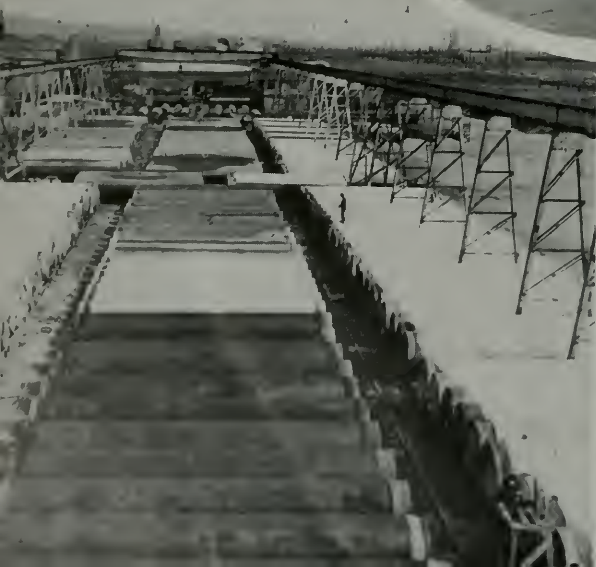
The following are the executive officers of Consolidated Steel Corporation, Ltd.: **D. G. Henderson, president; Alden G. Roach, executive vice president; Lloyd R. Earl, vice president.**

The Shipbuilding Division is segregated in the following manner:

Alden G. Roach, executive vice

Above and below, four views of Consolidated Steel shops at Los Angeles, Calif. Upper left, the Plate Shop, featuring assembly of tunnel forms and gantry. Upper right, Machine Shop assembly bay, featuring 102" ring seat gates for Grand Coulee Dam. Lower left, pipe spinning and curing yard. Lower right, south end of Weld Shop.

Center, a side launch[illegible] the Craig yard, L[illegible] Beach, in 1918. The sh[illegible] shown here will soon [illegible] fabricating steel for e[illegible] [illegible]ion on these ways, and [illegible] people of Southern C[illegible] fornia will once more th[illegible] at the sight of big sh[illegible] sliding into salt water.



president, is in charge of all phases of the Shipbuilding Division.

Lloyd R. Earl, vice president in charge of production, is in charge of production and operations at the Consolidated plant and Craig yard.

R. W. Gearhart is manager of the Control Department, supervising purchasing, costs analysis and schedules.

Captain C. S. McDowell, U. S. Navy (retired), formerly engineer officer at Mare Island, manager of the Pearl Harbor Navy Yard at Honolulu, and supervising engineer of the 200" telescope for Mt. Palomar, has ably assisted in negotiations, engineering and selection of personnel.

W. E. Spofford, formerly of Newport News Shipbuilding and Drydock Company, and senior naval architect with the United States Maritime Commission, has been retained as naval architect.

Captain Harry B. Hird, U. S. Navy (retired), recently manager of the Pearl Harbor Navy Yard at Honolulu, is retained as chief engineer.

Harry N. Ghenn, formerly of Newport News Shipbuilding and Drydock Company, has been retained as hull superintendent.

Edwin W. Hannay, formerly of Bethlehem Shipbuilding Corporation, has been retained to expedite fabrication and erection of ships.

George L. LaFrance, formerly of Craig Shipbuilding Company, is in charge of machinery installation.

Consolidated's officials expect to lay the first keel at the Craig ways at Long Beach about April 1, 1940. The contract calls for the delivery of the first ship fifteen months after effective date of contract, and one ship each two months thereafter until contract is completed.

The C-1-BT Ships

The ships to be built under the contract held by Consolidated Steel Corporation, Ltd., are of the type technically known as the United States Maritime Commission C-1-BT type. These symbols indicate a C-1 size vessel with a full scantling hull driven by a steam turbine.

Specifically, this vessel will have the general characteristics indicated below:

Length overall (approx.)	416'0"
Length B. P.	395'0"
Beam molded	60'0"
Depth molded S. D.	37'6"
Draft molded loaded	27'6"
Deck height, 2nd to shelter	9'6"
Deck height, 3d to 2nd	10'6"
Sea speed, loaded	14 knots
S.H.P. normal	4,000
Crew, normal	43
Passenger capacity	8
Gross measurement	6,750 tons
Net measurement	2,820 tons
Weights: Hull steel	2,365 tons
Outfit	767 tons
Engineering	500 tons
Margin	168 tons
Total built weight	3,800 tons
Fuel oil	889 tons
Crew and stores	35 tons
Fresh water	336 tons
Deadweight cargo	7,815 tons
Loaded displacement	12,875 tons
Bale cubic capacity	450,146 cu. ft.

Machinery and Equipment

The propulsion machinery will include two Babcock and Wilcox marine type water tube boilers, burning oil under forced draft and delivering steam at 450 pound gage pressure and 750° F. temperature to a Westinghouse cross compound, double reduction gear marine turbine which, on normal rating, will deliver 4,000 shaft horsepower at 90 r.p.m. of the single screw propeller shaft. The turbines are to be capable of continuous operation at 10 per cent overload and two hours' operation at 25 per cent overload. Two Westinghouse steam turbine generating sets each of 250 K.W. capacity will furnish electric power for the auxiliaries. It is expected that the fuel consumption at 14 knots sea speed will approximate 166 barrels per 24 hours. Complete fire detection and extinguishing system will cover all cargo spaces. All furniture, partitions and joiner work in passenger and crew accommodations is to be of incombustible material.

The galley is a modern streamline kitchen, trimmed in stainless steel, fitted with sanitary tile floor, and equipped with all the latest electric cooking and culinary gadgets.

Some of the major items with which these vessels will be equipped are as follows:

Boilers: Babcock & Wilcox Company.

Turbines and Generators: Westinghouse Electric & Mfg. Co.

Pumps: Worthington Pump & Machinery Corp.

Electric Motors: Westinghouse and General Electric.

Propellers: Doran Company.

Evaporators and Distillers: Davis Engineering Company.

Shafting: Bethlehem Steel Company.

Pipe, Valves and Fittings: Crane Company.

Steel Castings: Columbia Steel.

Anchors and Chains: Columbia Steel.

Steering Mechanism: Lidgerwood Manufacturing Company.

Electric Cable: General Cable Corporation.

Windlass, Capstans, and Cargo Winches: American Hoist & Derrick Company.

Life Boats: Welin Davit & Boat Co.

Three phases of a side launching at the Craig yard, Long Beach, during the hectic days of 1918.

Remarkable

Made by

Joseph A. Moore,
president,
and
Harry Fawke,
superinendent of hull
construction,
Moore Dry Dock Company

Sea Star as she will appear when finished.

Hull Construction Records

Moore Dry Dock Company On Maritime Commission C-3s

On December 22 the Moore Dry Dock Company of Oakland launched their second C-3 cargo carrier for the Maritime Commission. This vessel was christened Sea Star. Her sister, Sea Arrow, was launched from the same ways on September 15, and the keel of Sea Star was laid September 19. Sixty-three working days thereafter, Sea Star was ready for launching.

This type of record shows very fine coordination and cooperation between management, materials and men on the job. To do this job of work in this space of time means that every difficulty has been ironed out by a master of diplomacy and tact who knows ship construction from the keel up. It means also that the flow of materials and the disposition of the personnel have been coordinated with great skill and splendid patience.

The answer to the question, "What makes things click at Moore's yard?" lies chiefly in two personalities, Joseph A. Moore, president of the firm, and Harry Fawke, its superintendent of hull construction. For thirty-three years these two men have worked together as shipbuilders. Their mutual respect and cooperative skill have grown continuously during those three decades.

This compatability is well illustrated by the story of the final selection of the launching date for Sea Star. The date had been set for December 29 after a consultation between the heads of the firm. A few days later, Harry Fawke, meeting Mr. Moore in the yard, said to him, "Joe, I don't like your launching date."

"Why not?" said Mr. Moore.

"Well," said Mr. Fawke, "I've got to go down and have Christmas with my family in Arizona, and I just don't think I could do it comfortably unless that ship is in the water before I go."

"Can you have her ready a week earlier?" asked Mr. Moore.

"Sure!" opined Harry; "very easily."

"All right," agreed Mr. Moore; "we'll make it the 22nd."

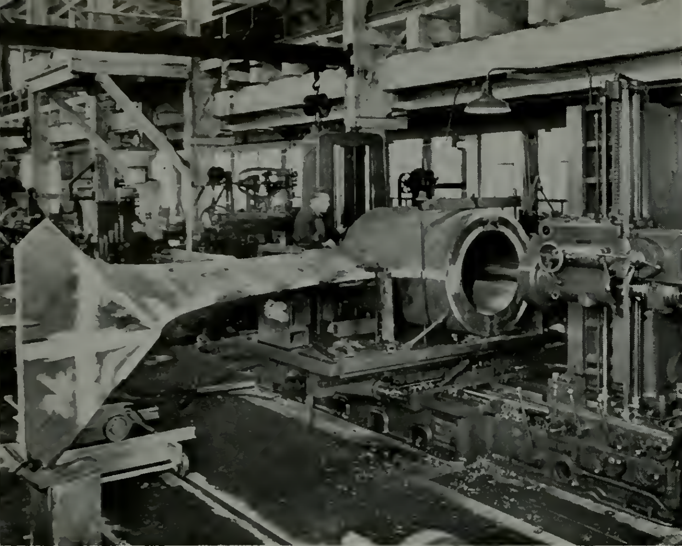
And that's the way they have been getting along for thirty-three years.

The shipbuilding record of those three decades is an impressive one. Sea Star is Hull Number 196. Included in this number series are ferries, dredge hulls, barges, bridge caissons, cargo carriers, tankers. The list includes the largest cargo carriers and the finest ferries ever built on the Pacific Coast, and the largest bridge caisson ever built by a shipyard.

As the Moore Shipbuilding Company, this firm built many large cargo carriers for the U. S. Shipping Board, and during that shipbuilding boom period this firm was operating eight shipbuilding ways. Three of these ways were 600 feet in length, and the company was ready to bid on any vessel then under contemplation by the U. S. Shipping Board or by the U. S. Navy.

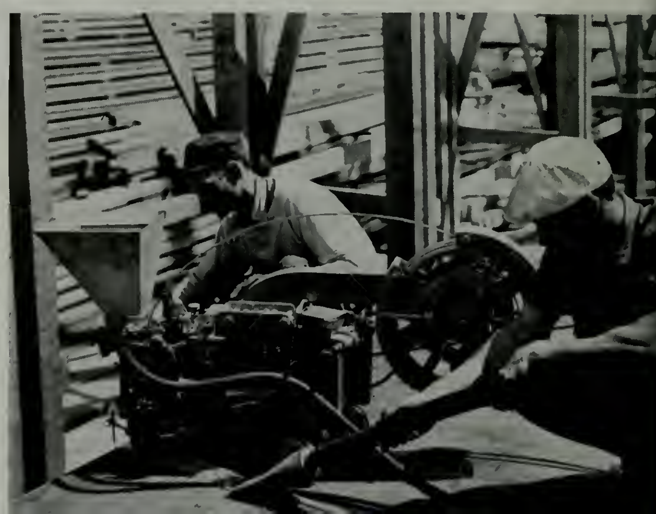
At the peak, the Moore Shipbuilding Company had over 13,000 men on the pay roll. On December 20, 1919, this yard staged a world's record in ship launchings by putting overboard six large vessels in 52 minutes. These comprised three tankers, each of 10,000 tons deadweight capacity, and three cargo vessels, each of 9,400 tons deadweight capacity.

During the twelve calendar months of 1919 the Moore Shipbuilding Company delivered to the U. S. Shipping Board 13 vessels, with an aggregated deadweight tonnage capacity of 122,800 tons.



Shop equipment and yard facilities at the plant of Moore Dry Dock Company.

Upper panel, vie[illegible] Machine Shop
Center, yard cranes[illegible] ting 40-ton section [illegible] tank top.
Lower panel, shapin[illegible] channels in bendin[illegible] and Unionmelt aut[illegible] welding head w[illegible] tank top seam.



In the five years from 1917 to 1921, inclusive, this yard expanded from a one way, one dockyard, to a plant with eight building ways, three floating docks, two marine railways and adequate shops, and during this expansion period delivered sixty-two hulls, aggregating 563,755 tons of deadweight capacity.

So much for their past history, to show that records for ship steel fabrication and erection are not new to the Moore shipyard, but are naturally inherent to the organization which operates that plant.

Of course, there are many other key men in the Moore organization to whom great credit is due for the fine work being done in that yard. However, these men are all in the key spots because they cooperate 100 per cent with the big cooperators, Joe and Harry, and so the work all flows swiftly and smoothly to its appointed end, and the job is turned out in record time.

Even this whole-hearted cooperation would be of little avail in producing records in modern shipbuilding were it not for the skill with which the layout of the Moore shipbuilding facilities was planned and the great care given to supply adequate equipment for all the necessary operations.

After Moore executives had carefully surveyed the modern technique of ship erection by large welded assemblies as practiced in Atlantic Coast shipyards, they were impressed with the value to this method of large open space close to the erecting ways for welding operations. Consequently, the new building way was designed with portal gantry trackage on both sides and located in the center of a large open space. This layout allows simultaneous welding of several large assemblies, and continuous and efficient use of several large gantry cranes.

We have already described in these columns the Unionmelt welding process as used in this yard. The welding racks on each side of the erecting ways are supplied with numerous outlets for welding sets to supply the proper current to these automatic welding machines. On these racks both flame cutting and welding operations are carried out with machine precision, and the crane service is such that welded complete bulkhead or inner bottom assemblies weighing from 25 to 45 tons are spotted with precision and tack welded to the erected hull in less time than it takes to tell about it.

Prior to taking the contract for these vessels, Moore Dry Dock Company had built and equipped the finest steel fabrication shop on the Pacific Coast. The automatic duplication multiple punches installed in this shop have been very advantageously used in duplicate work on ships' plates and shapes.

The tools in the already well-equipped machine shop have been supplemented by the installation of modern heavy boring mills, lathes and planers.

The plate shop, the mold loft, the bending slabs and their furnaces, the blacksmith shop, the pipe shop, the coppersmith shop, the pattern and joiner shop and the brass foundry are all well equipped and efficiently functioning factors in this record-breaking establishment.

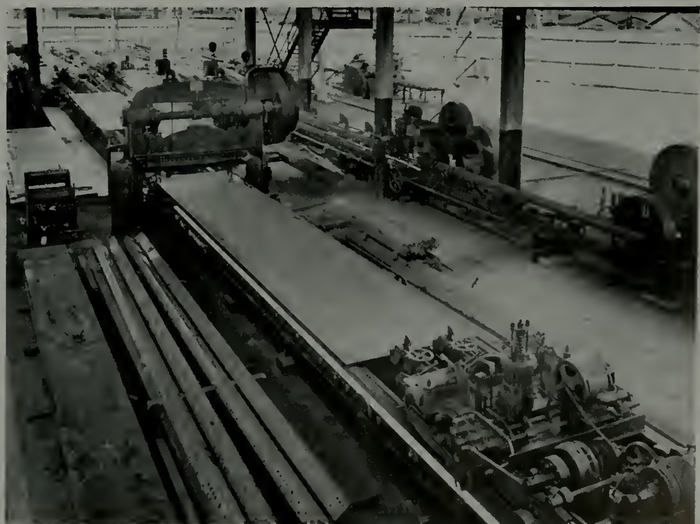
There are many noted iron foundries in the San Francisco Bay area, and the Columbia Steel division of the U. S. Steel Corporation is tops in producing large steel castings, such as the stem and stern frames of these large cargo carriers.

So the Moore Dry Dock Company, equipped and organized, is again making Pacific Coast shipbuilding history.

The good ship Sea Arrow is considerably ahead of her schedule, and is now waiting for machinery deliveries.

Above, stern view of Sea Star ready for launching. Note the beautifully-molded run aft. Apparently her oil burners need adjustment.

Below, a view in the structural steel shop at Moore's showing the big automatic spacing punch busy on bottom shell plating for the Sea Star.



A Renewal of Shipbuilding

Seattle - Tacoma Great Shipyard

R. J. LAMONT
President,

and

WALTER L. GREEN
Vice President and General Manager

Seattle-Tacoma Shipbuilding Corp.

on Puget Sound

Shipbuilding Corporation's To Be Completed February 1st

By CHARLES F. A. MANN

U. S. scout cruiser Omaha, built by Todd's Tacoma yard in 1921, was speed champion in her class.

With less than ten weeks elapsed time between the pouring of footing blocks and leveling operations on the outer end of the historic site of the former huge Todd shipyard at Tacoma, to finished shipyard, somewhat of a record in construction projects has been made at the new plant of the Seattle-Tacoma Shipbuilding Corp.

Since the completion of the Southern Pacific steamer Bienville in 1924, the World War Todd plant at Tacoma has become a huge industrial district. Two large California oil companies and a great electrochemical plant occupy one rim of the tract. The vast mold loft building used for war-time ship layouts became a factory located just west of the world's largest door factory. However, the prize section of the whole Todd tract, lying at the extreme outer end of the land, between Hylebos and Sitkum waterway, comprising about 70 acres of dry land and about the same acreage of hard tideland, has been permanently reserved for the new Todd-sponsored shipyard. Water 300 feet deep just a ship's length from the end of the new 500-ft. building ways, with 1½ miles of open sound beyond, provide an ideal site for a great steel shipyard.

The new Seattle-Tacoma yard is headed by R. J. Lamont, able president of the Todd-Seattle Drydocks, Inc., a unit of Todd Shipyard Corp. J. A. MacEachern, of General Construction Co., is vice-president. General Construction undertook to build the entire shipyard at Tacoma in less than 90 days, and at the time of writing this (January 5) there are over 450 men at work rushing the plant to completion well inside the time limit. The entire tract has been fenced; every piece of water, compressed air and steam piping, and all A. C. and D. C. electric wiring and telephone conduit have been placed underground, with convenient surface outlets. A mile of broad roadway within the plant is being paved with heavy asphaltic concrete laid on a thick crushed rock mat. These preparations are of great interest, as indicating a permanent set-up that does not bode early closing.

Construction of the buildings has been done entirely with heavy Douglas fir timbers, using the latest types of timber trusses, developed to increase the unsupported spans. Use of wood is natural at Tacoma, because of the heavy clears that are selected from 14 lumber mills by a centralized purchasing agency and delivered as needed for each phase of the job.

First building to be completed was the mold loft-shop-storeroom building. This is 130 x 260 feet in overall size, two stories high. A curved Summer-Bell trussed roof, entirely of wood, gives a clear width in the mold loft of 130 feet and the full length of 260 feet, with extremely shallow roof trusses. The entire building is protected with sprinkler system, and is lighted by floodlights every 15 feet. A heavy tongue and grooved floor laid on a 45-degree angle gives a smooth layout surface for the patterns, both hard and very light-colored. The lower floor of this building is given over to storerooms, general shops for the pipe fitters, electricians, riggers and machinists, and large locker space for employees. Dunham hot water units with electric fan circulation are used to heat the entire structure. The building has an easy ramp leading to the second floor, and is painted a green-gray color that will not turn chalky. The Parker Painting Company, contractors for painting Tacoma Narrows Bridge, has the contract for painting the buildings in the yard.

A small building to the North of the main group houses the oil-fired automatic hot water heating plant.

A large 2-story office building has been moved from Seattle via barge and set up on new concrete foundations. This office structure was finished January 5, and the staff moved in from Seattle and New York January 8. Across the main entrance roadway to the West is the steel fabrication building layout. One space is 50 x 200 feet. and there are four fabricating bays

Three views showing remarkable progress made by the General Construction Co., who undertook to complete this entire shipyard in 90 days. Upper, a general view, showing huge mold loft and shop building at left, skeleton of plate shop at right, crane track foundation center foreground, and inshore corner of No. 1 way at lower right corner. Left, a close-up of mold loft. Bottom, general view of waterfront, showing inshore end of two ways, unfinished crane piers, and, in foreground, welding fabrication platform.

each 50 x 150 feet. An indoor assembly platform 80 x 360 ft. is provided with overhead cranes throughout. All machinery for handling steel plates rests on concrete overlaying deep-driven piling.

Directly in front of the steel shed are the first two shipways, two ways each nearly 500 feet long with a crane-way between.

The ways are entirely open, due to favorable climatic condition prevailing throughout the year, and between the upper end of the ways and the steel fabrication building is an outdoor assembly platform 80 x 360 ft. Three Clyde 40-ton Whirley cranes operate on the tracks between the shipways.

While only two ways are to be used to start off construction of the first 5 C-1 full scantling ships, provision for ten more ways can be arranged later if necessary.

The original reinforced concrete power substation, built in 1917, alone remains as the survivor of 1930 wrecking operations. This heavy building is 34 x 42 feet, and will have two 300-KVA motor generator sets for direct current power for the Whirley cranes and cranes in the steel shed. Capacity for 2,500 KVA is provided.

Electric power is provided by Tacoma's municipal system at 3,000 volts A. C. Electric power will be important in this yard, as the majority of the joints in these ships will be electrically welded. To begin with, thirty 300-amp. portable welding sets and six Unionmelt automatic welders of the latest design have been ordered.

Provision has been made to handle steel via rail or water.

The plant is equipped to turn out finished hulls at a high rate of production, being ideally located and compactly arranged. The first five ships will be launched and towed to Seattle for installation of machinery at the Todd Seattle plant.

Steel for the new ships will begin arriving about January 20, and the first keel laying is expected about February 20.

Each ship will be twin screw, with two Hooven - Owens - Rentschler 2-cycle, 6-cylinder diesels, each developing 2,100 h. p. at 233 r. p. m. and geared to one propeller shaft through Westinghouse electro dynamic couplings and reduction gearing. They will drive the propeller at 90 r. p. m. for a ship speed of 14 knots.

The Seattle plant of the Todd Seattle Dry Docks, Incorporated, is an important cog in the Seattle-Tacoma Shipbuilding Corporation building plans. Hulls erected in the great shipyard at Tacoma will be towed across to this plant on the Seattle waterfront for machinery and equipment installation. The San Vincente, a Todd-built ship, is here shown on a Todd Seattle drydock for overhaul.

Orders were placed in October for ten Washington diesels with the Washington Iron Works at Seattle. Two of these engines will be installed in each ship for auxiliary electric power. The engines are the well known, reliable, 4-cycle, trunk piston type, developing 400 horsepower, and having 6 cylinders.

Walter L. Green will be vice-president and general manager, and O. A. Tucker will be assistant to Mr. Lamont.

Big Propellers For Seattle Firm

Four of the largest propellers ever made on the Pacific Coast will be built by the Doran Company of Seattle, famous Coast propeller builders, for the Moore Dry Dock Co. of Oakland, Calif., to be installed on the C-3 ships now building there. Each wheel will be 21 feet, 8 inches in diameter, and will weigh about 23 tons. They are four-bladed bronze propellers, and the molds in which they will be cast are made from patterns built entirely of Western red cedar. The big wheels are shipped on the deck of coastwise steamers and unloaded directly at the shipyard.

Columbia River Tug Keith Finished

The world's first diesel "open river" tug has been finished at Portland by the Commercial Iron Works for operation between the upper end of The Dalles-Cellilo Canal to Umatilla in the open, wild Columbia River, a distance of about 100 miles. The new tug is of welded steel, and is 92.6 x 25.6 x 6.6 feet and is of shallow draft, with twin tunnels for the propellers. The power is twin diesel engines delivering maximum power at 500 r. p. m., of the new Enterprise light-weight design mounted on Korfund Vibro Mats. Later these engines will be supercharged with Buchi turbo blowers, deriving power from the exhaust gases. Under supercharging, the total power from both engines will be 2500 S. H. P. This tug is designed to successfully handle large tows in river currents up to 9 knots. She has pneumatic rudders with three complete sets of pilot house engine controls and rudder controls. She is named after the son of Capt. A. Leppaluto, general manager of the company and skipper of the tug.

H. G. TALLERDAY

President,

Western Pipe & Steel Company

Building Ships Again At South San Francisco

Western Pipe & Steel Company Recreate Their Former Schaw-Batcher Side-Launching Shipyard

There were many shipyards on San Francisco Bay in the hectic "Bridge-of-Ships" days of the U. S. Shipping Board war-time program. All of these yards built good steel vessels, and several of them made national records for speed in turning out finished ships.

However, among these yards there was one that attracted special attention for several reasons:

First, this yard was located on a basin at the edge of a tidal flat far removed from deep water, and connected thereto by a long channel;

Second, this yard was the only yard in the Bay region to launch its vessels sidewise; and

Third, the vessels built in this yard seem to have been selected by the U. S. Shipping Board for experimentation in the art of camouflage. With many of these steamers in their war paint, it was hard to tell whether they were coming or going, right side up or upside down.

This was the Western Pipe & Steel Co.'s plant at South San Francisco, which was operated under the name of the Schaw-Batcher Shipyard.

After the war shipbuilding was completed, this firm enlarged the main shop building into one of the largest steel pipe fabricating plants on the West Coast and equipped this plant especially for fabrication by welding. Some of the largest pipe contracts of recent years have come to this plant for fabrication. Here, too, an occasional steel barge or dredge hull was fabricated, which kept the plant in some touch with floating equipment.

When the U. S. Maritime Commission called for bids on the C-1 type cargo vessels, Western Pipe and Steel Company made a tender. The result was a contract to build five C-1 type full scantling motorships.

Preparing the Yard

To meet the terms of this contract, Western Pipe & Steel Company of California have rebuilt two side launching ways on the West side of the basin, which will enable them to build two C-1s simultaneously. The contract calls for delivery of the first ship in 15 months from Nov. 15, 1939, effective date of contract, and one ship each 60 days thereafter. The two ways will be sufficient to meet these dates. Should more contracts develop, the two ways on the East side of the basin will be rebuilt.

Two new Colby full revolving ship cranes are being installed to handle large welded assemblies and heavy machinery installation. A mold loft and bending slabs have been prepared, and a large opening welding rack arranged adjacent to the shore end of building ways.

Steel for the first ship is en route, and it is expected that the first keel will be laid in February.

Western Pipe & Steel Company is a well-organized, smoothly-functioning firm. They have handled successfully some of the largest contracts for steel fabrication and erection in Western America. They should have no difficulty in finishing these vessels and in producing trial trip results satisfactory to the Maritime Commission.

The Ships to be Built

The ships are specifically classed by the Commission as C-1 B. D., i. e., Commission-designed steel cargo vessels of the C-1 size and the full scantling type driven by diesel engines. Each of these vessels will require:

Fabrication and erection of 2,365 tons of ship steel in the hull;

The preparation and installation of 768 tons of equipment, outfit and rigging; and

The manufacture and installation of 600 tons of machinery.

Specified Equipment

Specifications call for such items as:

Twelve standard five-ton cargo booms and one 50-ton cargo boom, served by 12 electric cargo winches;

A forced system of ventilation for all cargo spaces;

A complete smoke detection and CO_2 fire extinguishing system;

Full radio equipment of the most modern type;

All furniture and all joiner work to be of incombustible materials;

A modern, sanitary, stainless steel trimmed galley fitted with all electric cooking devices; and

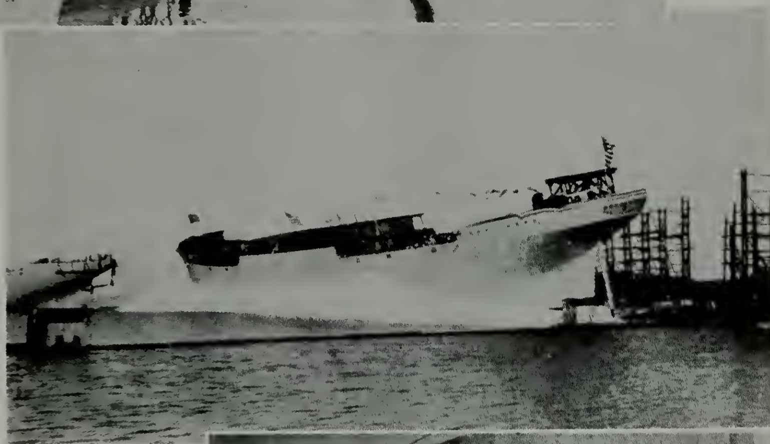
A power plant giving 4,000 shaft horsepower at 90 r.p.m. of the propeller shaft and producing a maintained sea speed of 14 knots or better.

Propulsion Machinery

The diesel power plant of each of the five ships building at the yard of Western Pipe and Steel Company will consist of two six-cylinder directly reversible 2100 shaft horsepower Busch Sulzer diesel engines, each connected through a hydraulic ship coupling to one of the pinions of a single reduction gear. The slow speed gear of this reduction set is connected directly to the propeller line shafting.

These engines must be able to operate continuously at 10 per cent overload and for two hours at 25 per cent overload.

Fresh water will be circulated for cylinder cooling purposes, and will itself be cooled by salt water in a heat



Side launching at South San Francisco in the U. S. Shipping Board wartime shipbuilding program. Upper view shows the 8,800-ton steamer West Avenal going over. Center, the Oskaloosa turning loose. Lower, axe men standing ready to cut away lashings on triggers of the dog shores at stern of West Avenal.

exchanger. A De Laval oil purifier will be installed to take care of lubricating oil.

Ingersoll-Rand air compressors will supply pressure air for maneuvering and starting.

Some Auxiliaries

Auxiliary power will be generated by two 300-K.W. General Electric generators each directly connected to an Atlas 450-H.P. diesel engine. Practically all auxiliaries will be operated by General Electric motors, and electric power will be distributed and controlled through and by General Electric equipment.

In the pumping equipment, Warren, Worthington, Nash and Quinby are all represented.

Refrigeration machinery is by Carrier.

The Markey Machinery Company of Seattle are manufacturing the windlass and the capstans for each vessel.

American Hoist and Derrick Company will build the cargo winches.

The steering gear will be made by Lidgerwood.

The Doran Company of Seattle will cast the big bronze propellers.

Among the navigation equipment will be found: Sperry gyro compass, gyro pilot, rudder indicators, and searchlights; Submarine Signal Company fathometers; Radio Marine Corporation transmitting and receiving sets.

This list shows the manner in which the building of these vessels will benefit many manufacturing plants thousands of miles removed from the shipyard, and how widespread is the receipt of wages due to a shipbuilding contract.

Sydney Office, United Air Lines

Because of the increased air travel from the Orient and the Antipodes, United Air Lines is establishing a branch office in Sydney, Australia, it was announced recently by **S. A. Stimpson,** regional traffic manager.

Heading the office will be **Edward H. Forrest,** formerly with the Matson Navigation Company, and for the past three years manager of United's foreign travel department, with headquarters in San Francisco. Accompanying him on the trip will be **Huck Longfellow,** veteran Dollar Steamship executive, who has been United's European travel manager, with headquarters in London, until a short time ago, when the war curtailed his activities.

Forrest flew to Los Angeles on December 1 to embark on the Matsonia for Honolulu, where he met Longfellow, who left San Francisco on the Pan American clipper on December 5. Together, the two sailed on the S.S. Mariposa for Sydney, Australia, and a year's extensive tour of Australia, New Zealand, the Dutch East Indies, China, Japan and Manila. At the end of that time Longfellow will return to London, should war conditions permit, and Forrest will be left in charge of the Australian office.

Change of Masters

Stmr. Point Salinas: Victor Segar; vice, J. T. Larsen.
Stmr. Point Judith: J. T. Larsen; vice, Victor Segar.
Stmr. Nabesna: Gustave E. Swanson; vice, C. E. Carlsen.
Stmr. Manoa: M. Gordenov; vice, J. E. Dollard.
Stmr. Makawao: A. W. Jemsen; vice, C. W. Saunders, Jr.,
Stmr. Absaroka: Oscar P. Carson; vice, J. R. Granman.
Stmr. W. H. Berg: R. M. Stall; vice, D. Thomson.
Stmr. Associated: E. Hawkins; vice, R. W. Kelly.
Stmr. Mapele: F. E. Trask; vice, L. A. Petersen.
Stmr. Kewanee: D. D. Maclean; vice, J. F. Humphrey.
Stmr. Delawaren: O. D. Oliver; vice, T. J. Butler.
Stmr. Paul Shoup: R. W. Kelly; vice, L. J. Thompson.

Improved Red Lead Linseed Oil Paint

A substantial speed-up in drying results through the modification of red lead-linseed oil paints by the replacement of approximately 3 pounds of red lead with Leafed Metallic Lead Paste per gallon of paint.

The Metalead Products Corporation, San Francisco, manufacturers of the Leafed Metallic Lead Paste, further state that the incorporation of this paste will totally eliminate top coat crawl, even when using a following coat of high surface tension.

Especially noticeable is the absence of pigment separation over rivet heads and away from sharp corners and edges of structural steel. Another feature is improved adhesion to the metal.

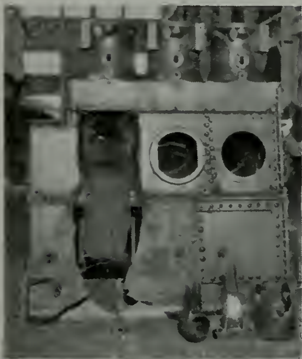
If the paint is applied by spray, greater ease of application will be obtained because of better coverage and the absence of running or sagging. In brush applications the painter will find greater ease of brushing and spreading less tiresome. Whether applied by spray or brush, a flat, uniform finish is obtained.

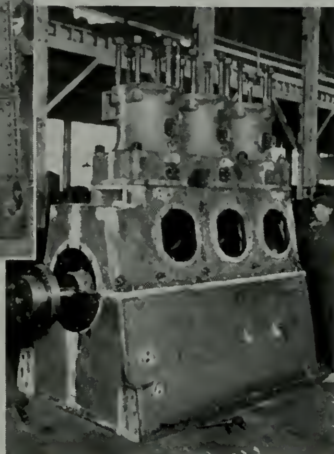
This paste may be added to ready-mixed red lead-linseed oil paint; or the modified red lead-metallic lead-linseed oil paint, ready-mixed, may be secured through nearly all suppliers of red lead linseed oil paints.

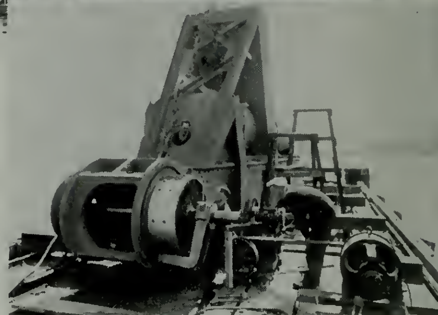
Catalog No. 78 from The Lunkenheimer Company includes a comprehensive representation of bronze, iron and steel valves, boiler mountings, lubricating devices, air devices and numerous other specialties; also current list prices.

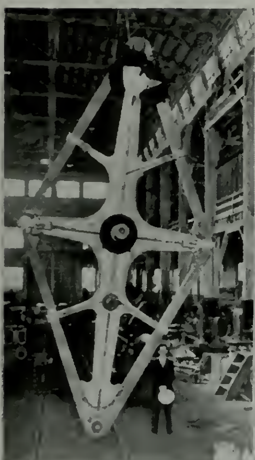
In addition to the technical and dimensional data relating directly to the products, there is a section on the thermodynamic properties of steam, and a table of shipping weights covering each figure number listed in the catalog.

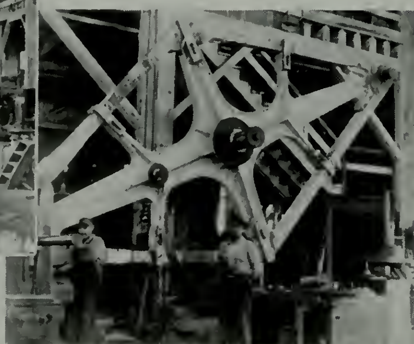
Typical Repair Jobs by General Engineering











Upper left, views showing wrecked auxiliary 3-cylinder diesel engine and completely rebuilt unit with new crank shaft ready for installation aboard ship. Upper right, the removing of a 90-ton ladder from the U. S. Army Engineers' suction dredge Dan C. Kingman, showing ladder on outfitting dock with special boring equipment for machining trunnion bearings.

Above, two views showing walking beam, 12 by 24 feet, for the ferryboat Eureka, after forging, machining and installing 6 by 8 inch band around spider. Right, progress views showing broken stern frame being removed from the tanker Tulsagas; second stage showing stern frame partially completed in machine shop; showing stern frame completely installed, with the ship ready for sea.

General Engineering & Dry Dock Co.

Maintains Engineering Plant in San Francisco And Complete Shipyard On Oakland Estuary

George A. Armes, president.

The equipment and facilities maintained at San Francisco and on the Oakland Estuary by the General Engineering & Dry Dock Co., and the experience and initiative of the executives of this firm, have combined to produce an organization that has become a very potent factor in the fields of marine repairs and shipbuilding.

On the San Francisco side, this firm has a compact group of very well-equipped shops capable of handling all marine and machinery repairs and overhaul. These shops are located a short block from the famous Embarcadero of San Francisco's waterfront,

F. H. Fox, chief engineer.

and have excellent spur track connections to all transcontinental railways and to all piers through the waterfront belt line.

Buildings include: machine shop, fully equipped with the most modern precision tools for producing perfect finish to exact dimensions; carpenter shop, equipped to produce the finest of ship joiner work; pipe shop, tooled for cutting, threading, welding and bending all sizes of marine pipes and tubes; plate and boiler shop, fitted with every device necessary to bend, shear, punch, plane, rivet or weld ship and boiler plating; forge shop, capable of producing the best in ship forgings; and pattern shop, in which patterns for the most intricate castings can be produced economically by experienced craftsmen.

On the Oakland Estuary, General Engineering & Dry Dock Co. maintain and operate a fully-equipped shipyard on the Alameda shore of Oakland's inner harbor. Here the firm owns twenty acres, with a fine frontage on deep water.

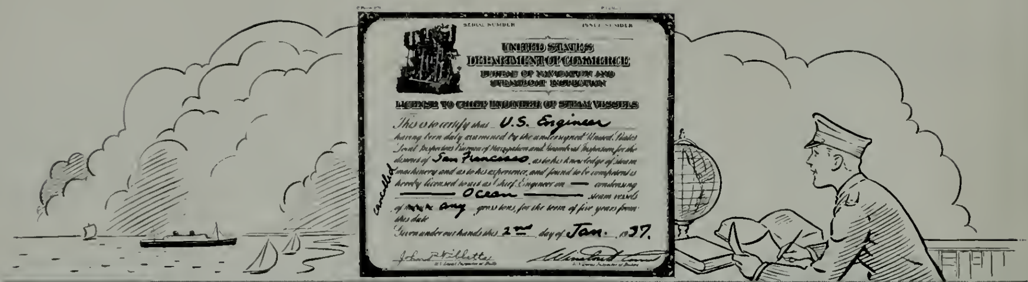
This yard is well equipped with two floating docks, three shipbuilding ways, and ample shops, fitted with efficient tools and machinery. Here have been built many good hulls, including such types as Coast Guard cutters, small coasting steamers, large auto and passenger ferries, dredges and barges.

The site has been operated as a shipyard for many years, and here, in the nineties, were built many fine wooden hulls for lumber schooners, South Sea traders, whalers and coastwise cargo ships.

The General Engineering organization has attracted to itself many active and enterprising younger men in marine engineering and ship construction work. Its president, George A. Armes, has had longer experience as the chief executive of shipbuilding and ship repair plants than any other Pacific Coast shipbuilder.

With an excellent plant, and with an efficient, experienced organization to operate that plant, General Engineering is entering 1940 with confidence, and is looking forward to many good repair jobs and to very fine prospects for new construction contracts.

The ways at their Alameda yard are of sufficient capacity to take C-1 cargo vessels, and could easily be enlarged for bigger hulls.



Your Problems Answered
by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

The Marine Engineer
And His Books

There have been so many letters like the following that we feel it desirable to interrupt our series on boiler feed water to cover the general question of books, particularly as selected for preparation for the new examinations.

Sir:

In looking through your magazine of late issue I find just what I am interested in, and that is, third engineer's license and all 1940 new questions and requirements, and notice you carry a line of books pertaining to these new requirements.

If possible, could you send me a good book to study, payable on this end, or tell me the name and price so I can forward an order? Also, while I'm at it, I would like to subscribe to Pacific Marine Review for one year.

Yours truly,
F. B.

Education from Books

The books listed in the October issue are, as stated in the text, only a list of the books in the library of the Examination Section of the Bureau of Marine Inspection and Navigation. They are not necessarily recommended by the Bureau or by "The Chief."

Each marine engineer is an individual, each having different educational experiences and ability to learn. Each should have a special selection of books. Thus it is very difficult to recommend to the profession in general.

"The Chief" has had many years of experience in educational work with engineers, and recommends the books listed at the end of this article, which is repeating to a large extent what he has covered in this section from time to time in the past.

Do not be misled to believe that having a lot of books, however good, will give you the education to pass the examination. It is *you* who must put together the education. This requires a continuous effort, to set aside a regular time, to study, work problems, create questions and dig to find the answers.

Ship the Best Teacher

The best educational influence you have is your ship. When on watch be curious about every part, every unit. Tell yourself all about it; or, better, explain it to someone junior to you. No one learns quite so much as the teacher. Do not let a question slip by. If necessary, make a note of it and dig out the answer in your own or in borrowed books. Read every technical article you can put your hands on. Develop a critical attitude toward your reading. Write to the magazine and debate a point you don't understand.

Education is a process of fitting together all of the many little bits of information you get into a common or whole fabric. It is like a jig-saw puzzle. When completed, it forms a wonderful and beautiful picture. Many pieces will be found not to fit with what you already have. Perhaps they are not right—the information distorted. It must be straightened out.

Think, puzzle, ponder, read, and think some more. With that attitude towards your work you will soon educate yourself. A man who thinks and reasons will handle an indicator with more intelligent results, though never having seen or heard of one before, than a man who cannot or does not habitually think, but has watched its use and tried it many times.

Auxiliary Books

Do not think that you must read only marine engineering books. Ninety per cent of the information about ashore steam plants applies to marine plants. The differences are obvious. If you know the shore plant thoroughly, you know most of the marine plant. Also, there are many important considerations about your job as a marine engineer that are not treated in technical books. Some of these are rules and regulations, duties, safety precautions of all kinds, character, bearing and demeanor of a merchant marine officer, and handling men.

Therefore, while any books on steam engineering are a valuable addition to your library, there should be added special publications by the Bureau, the Navy Department, manufacturing and engineering firms. Also recommended are non-fiction books other than engineering, such as biographies of great men, travels and exploration.

Unless your education includes the equivalent of a college course, select books which are profusely illustrated with sketches and diagrams, first, because sketches are of great educational value; second, because that type of book will be written in less technical language and will be understandable.

If you have a book not listed in this tabulation, use it; or if you have a chance to get one or a set, do so without regard to this list. For instance, books published by the large correspondence schools are excellent, but are not listed here because not ordinarily obtainable. There are many worthwhile books not listed.

The books listed have been selected not because they are necessarily recent or modern, but for their educational value. As a matter of fact, the modern high-pressure steam turbine marine plant has not yet been well covered in books. Modern engineering is recorded in magazines, pamphlets and advertisements for several years before it gets into books.

By all means read advertisements in the technical magazines. There is a tremendous educational value in them. Be curious about them; write to the firms and get their pamphlets and details.

Unlisted Books

The books listed here are not all strictly marine. They are listed in no particular order, and are numbered. The various items are recommended by number in the tabulation. Not all books listed are referred to in the tabulation. The tabulation is an attempt to show what we feel the engineers should have available. If properly read and studied, these books will add to your education and will constitute a valuable reference library.

Literature not listed, but that every marine engineer should have, it *Rules and Regulations*, Bureau of Marine Inspection and Navigation. Obtain from nearest local examiner. Also *Manual of Engineering Instructions;* a collection of pamphlets published by the Bureau of Engineering, U. S. Navy Dept. Obtain them from Superintendent of Documents, Washington, D. C. Priced at from 5 to 75 cents each; over 32 separate pamphlets on nearly every engineering subject. Index has been published in this section before. Write "The Chief," if interested, or direct to above address.

Any books in the following list may be obtained from any technical book store, or send money order to Technical Book Company, 432 Market Street, San Francisco, Calif. Orders sent to "The Chief" will be handed to this company for filling.

Many excellent books from foreign publishers are omitted from the list because of difficulty of obtaining them now, and cost, ranging from $15 to $25.

(1) *Questions and Answers for Marine Stationary Engineers;* Swingle. Descriptions of all parts of engines and boilers; $2.00.

(2) *Diesel Engine Manual;* Audel. Practical questions and answers, $2.00.

(3) *Practical Engineering;* Audel. Foundation principles; $1.00.

(4) *Mathematics and Calculations for Engineers;* Audel. Applied mathematics; $2.00.

(5) *Marine Engineer's Guide;* Audel. Textbook of marine practice; $3.00.

(6) *Answers on Refrigeration;* Audel. Questions and Answers. Theory and practice; $2.00.

(7) *Engineers' and Mechanics' Guide No. 1;* Audel. Engines, valve motions, pumps; $1.50.

(8) *Engineers' and Mechanics' Guide No. 3;* Audel. Marine Engines; turbines; the indicator; $1.50.

(9) *Engineers' and Mechanics' Guide No. 5;* Audel. Steam boilers, construction, control; $1.50.

(10) *Engineers' and Mechanics' Guide No. 6;* Audel. Oil burning; boiler codes; operation; $1.50.

(11) *Engineers' and Mechanics' Guide No. 8;* Audel. Electricity; complete, practical; $3.00.

(12) *Ship Sanitation and First Aid;* Ralph J. Levy. Questions and answers; $1.00.

(13) *Blue Book of Facts for Marine Engineers;* E. R. Glass. Questions and answers as found; $3.00.

(14) *Practical Heat;* Croft. Theory of heat in engine thermodynamics, basic and fundamental; $5.00.

(15) *Steam Turbines, Principle and Practice;* Croft. Basic principles, theory and practice; $3.00.

(16) *Steam Engine Principles and Practice;* Croft. Basic principles of stationary engines; $3.50.

(17) *Steam Boilers;* Croft. Stationary plants, theory and construction; $4.00.

(18) *Steam Power Plant Auxiliaries and Accessories;* Croft. Selection and operation; shore plants; $3.00.

(19 *Handbook for Steam Engineers and Electricians;* Swingle. Good, practical information; $4.00.

(20) *Marine Engineers' Handbook;* Sterling. Data and descriptions for designers and super chief; calculations; $7.00.

(21) *Handbook of Engineering Fundamentals;* Eshback. Data, tabulations, calculations, formulas; $5.00.

(22) *Mechanical Engineers' Handbook;* Kent. Power machinery; data, calculations, formulas; $5.00.

(23) *Mechanical Engineers' Handbook;* Marks. Thermodynamics and data for plant designers; $7.00.

Subject	Unlicensed	3d Ass't	2nd Ass't	1st Ass't	Chief	Super Chief
Mathematics	4, 41	4, 41	4, 41	4, 41	4, 46	46, 47
Mechanics	31	31	31	31	31	48
Drawing and Sketching		49	49	49	49	49
Steam and Heat Thermodynamics			14	14	14	14
Boilers, Auxiliaries and Feed Water	9	9	9, 45	9, 45	45	45
Oil and Combustion	10	10	10	10, 35	35	29, 35
Turbines and Engines Indicators	7, 8, 39	7,8,15,39	7, 8, 15, 39	15, 39		
Refrigeration	6	6	6, 43	43	43	43
Electricity	11	11, 33	11, 33	11, 33	11, 33	11, 33
Diesel Engines	2	2, 34	2, 32, 34	32, 34	32, 42	42
Marine Engineering General	1, 5, 13	1, 5, 13	1, 5, 13	5, 28	28	28, 25, 38
Mechanical Engineering - General	3	3	3	3	3	
General	12	12	12	12, 44	12, 44	44
Handbooks	19	22	22	22	20, 21	20,21,22,23

Tabulation by number and subject of listed books as recommended for marine engineer grades.

(24) *Marine Engines;* Peabody. Design and strength, reciprocating; $2.50.

(25) *Screw Propeller* (2 vol.); Dyson. Technical treatise on design and performance; $10.00

(26) *Steam Turbine Operation;* Kearton and Pitman. Practical treatise on finer points of turbine management; $4.50.

(27) *Elements of Diesel Engineering;* Adams. Descriptive and theory; $4.00.

(28) *Marine Power Plant;* Chapman. Textbook; all elements of the marine plant; $4.00.

(29) *Elements of Fuel Oil and Steam Engineering;* Sibley and Delany. Textbook; $5.00.

(30) *Fuel Economy in Boiler Rooms;* Maujer and Bromley. Combustion; calculation efficiency; $3.00.

(31) *Applied Mechanics;* Girvin. $3.00.

(32) *The Marine Motor;* Sterling. Fundamentals of the marine diesel; $2.50.

(33) *Marine ElectricPower;* Newman. Marine electric plant; descriptive and technical; $2.00.

(34) *Practical Marine Diesel Engineering;* Ford. Construction and operation, all types; questions and answers; textbook; $6.00.

(35) *Water Rates and Steam Consumption of Marine Machinery;* Brelsford and Stevens. Estimating fuel economy; $3.00.

(36) *Fuel Oils and Their Applications;* Mitchell. Use, selection, care of fuel oil for all purposes; $1.50.

(37) *Steam Turbines, Theory and Practice;* Kearton. For students and designers; textbook; $5.00.

(38) *Speed and Power of Ships;* Taylor. A manual of marine propulsion; $2.50.

(39) *Marine Steam Turbines;* Moyer. Twenty-four separate assignments as a text for correspondence instruction; $6.00 for set.

(40) *Computations for Marine Engines;* Peabody.

(41) *Mathematics for Technical and Vocational Schools;* Slade and Margolis. Practical and applied for self-study; $2.50.

(42) *Diesel Engine Operation, Maintenance and Repair;* Bushnell. Practical for operating engineers; $3.50.

(43) *Handbook of Refrigeration Engineering;* Woolrich. $5.00.

(44) *Steel and its Heat Treatment;* Bullens. Two vol.; $9.50 set.

(45) *Boiler Feed and Boiler Water Softening;* Blanning and Rich. A boiler operator's manual; $3.00.

(46) *The Engineers' Manual;* Hudson. Tabulations and formulas; $2.75.

(47) *Calculus;* Phillips. Applied to engineering; $3.00.

(48) *Mechanics of Materials;* Laurson and Cox. Textbook on calculating materials; $3.75.

(49) *Engineering, Descriptive Geometry and Drawing;* Bartlett and Johnson. Line and mechanical drawing; text; $5.50.

(50) *Machine Shop Operation;* Barritt. $5.00.

Engineers' Licenses for November

Name and Grade	Class	Condition
SEATTLE		
Harold H. Johansen, 1st Asst. Eng.	OSS, any GT	RG
Robert T. Maccoun, 2nd Asst. Eng.	OSS, any GT	RG
JUNEAU		
Roscoe M. Laughlin, Chief Eng.	OMS, not over 500GT	RG
Wayne E. Maunula, 2nd Asst. Eng.	OMS, any GT	O
SAN FRANCISCO		
Richard Thompson, Chief Eng.	OSS, any GT	RG
Karl G. Ofverborg, Chief Eng.	OSS, any GT	RG
Guy D. Ripley, Chief Eng.	OSS, any GT	RG
Louie Wright, Chief Eng.	OSS, any GT	RG
Walter E. Hinshaw, 1st Asst. Eng.	OSS, any GT	RG
James E. Foy, 1st Asst. Eng.	OSS, any GT	RG
Karl A. Kroener, 1st Asst. Eng.	OSS, any GT	RG
Frank Morales, 1st Asst. Eng.	OSS, any GT	RG
Fred Jennings, 1st Asst. Eng.	OSS, any GT	RG
Howard L. Mollenkopf, 2nd Asst. Eng.	OSS, any GT	RG
Frank R. Lewis, 2nd Asst. Eng.	OSS, any GT	RG
Charles R. Hake, 2nd Asst. Eng.	OSS, any GT	RG
Harry K. Short, 2nd Asst. Eng.	OSS, any GT	O
Carl C. Fitzgerald, 2nd Asst. Eng.	OSS, any GT	O
Albert A. Guest, 2nd Asst. Eng.	OSS, any GT	O
Earle J. Collins, 3d Asst. Eng.	OSS, any GT	O
Edward W. Walters, 3d Asst. Eng.	OSS, any GT	O
Charles D. Bostwick, 3d Asst. Eng.	OSS, any GT	O
Charles R. Ryerson, 3d Asst. Eng.	OSS, any GT	O
John J. Flanagan, Chief Eng.	OMS, any GT	RG
Wainel S. Bratt, 2nd Asst. Eng.	OMS, any GT	RG
Ernest Hartl, 2nd Asst. Eng.	OMS, any GT	O
Roy W. Danley, 3d Asst. Eng.	OMS, any GT	O
SAN PEDRO		
George L. Hildebrand, 2nd Asst. Eng.	OSS, any GT	RG
Artie L. Baldwin, 3d Asst. Eng.	OSS, any GT	O
Joseph H. Silva, 3d Asst. Eng.	OSS, any GT	O
David H. Taylor, 3d Asst. Eng.	OSS, any GT	O
Sevrin K. Rabben, Chief Eng.	OMS, 500 GT	O
Frederick G. Ernst, 2nd Asst. Eng.	OMS, any GT	RG
HOQUIAM		
Howard J. Smith, Chief Eng.	OSS, any GT	O
PORTLAND		
Frank F. Follett, 1st Asst. Eng.	OSS, any GT	RG
William A. Lemons, 1st Asst. Eng.	OSS, any GT	RG
John S. Temple, 3d Asst. Eng.	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raise of grade; O is original license; OSS is ocean steamship; OMS is ocean motorship.

"The Chief" advises every marine engineer if possible to get himself placed on the mailing list for the Bulletin, a very helpful monthly publication issued by the Bureau of Marine Inspection and Navigation of the United States Department of Commerce.

The November, 1939, issue of this Bulletin features full sets of specimen questions for the new examinations for all grades of marine engineers. "The Chief's section in February Pacific Marine Review will review and comment on typical questions from these examinations, but you should get the full set yourselves and study it carefully.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

SOLUTIONS FOR SPECIMEN PROBLEMS

To all shipmates, readers and 'riends, afloat and ashore, "The Skipper" extends hearty greetings and all good wishes for continued health and prosperity throughout the new year ahead of us.

Up to the time of writing these notes no reader has offered to solve the problems quoted last month. I am therefore giving my own solutions, and if any reader can suggest a shorter or easier method, just drop a line to "The Skipper," who is always glad to receive suggestions.

Question No. 2 (mensuration): The frustum of a cone and similar right cone each displace the same amount of water. Each is 30″ high and the cone has a dia. of 12″, while dia. of frustum is 14″. If the specific gravity of the cone is 0.9, find the specific gravity of frustum.

A little reasoning is required, and

QUESTION NO. 2

$$\frac{x}{30} = \frac{14}{12}, \quad x = \frac{14 \times 30}{12} = 35''$$

$$\frac{d_t}{5} = \frac{12}{30}, \quad d_t = \frac{5 \times 12}{30} = 2''$$

LET V_c = VOLUME OF CONE $= \frac{\pi H}{3}(R_c)^2$

V_f = VOLUME OF FRUSTUM $= \frac{\pi H}{3}(R_f^2 + R_t^2 + R_f R_t)$

S_c = SPECIFIC GRAVITY OF CONE = 0.9

S_f = SPECIFIC GRAVITY OF FRUSTUM

$$\frac{S_c}{S_f} = \frac{V_f}{V_c}, \quad S_f = \frac{S_c \times V_c}{V_f}$$

$$S_f = .9 \times \frac{\frac{\pi H}{3} \times 6^2}{\frac{\pi H}{3} \times (7^2 + 1^2 + 7 \times 1)}$$

$$= \frac{.9 \times 36}{57} = \underline{.5684}.\ \underline{\text{Sp. G.}}$$

THEREFORE, SPECIFIC GRAVITY OF FRUSTUM = .5684

QUESTION NO. 3

LET H = HIGHER HEIGHT.

THEN $\frac{H}{2}$ = LOWER.

AND $\frac{H}{\frac{H}{2}} = \frac{2}{1} = \frac{t^2}{(t-6)^2}$

THEREFORE $t^2 = 2(t-6)^2$

$= 2(t^2 - 12t + 36)$

$= 2t^2 - 24t + 72$

OR $t^2 - 24t + 72 = 0$

SOLVE BY FORMULA FOR QUADRATIC EQUATIONS OF THIS TYPE

$$t = \frac{24 \pm \sqrt{24^2 - 4 \times 72}}{2}$$

t = 20.4853 SECONDS

THEREFORE $H = \frac{1}{2} g t^2 \quad \frac{32.2 \times (20.4853)^2}{2}$

= 6762 FT.

THEN $\frac{H}{2}$ = 3381 FT — ANSWER

PROOF $\frac{H}{2} \quad \frac{32.2 \times (20.4853 - 6)^2}{2}$

$16.1 \times 210 \quad 3381$

it is evident that the question has been designed to test the candidate's powers of deduction. The cone and frustum being similar, and right (vertical) their base angles and hence slope of sides are equal. Referring to the annexed diagram, let x = the full height of the cone of which the frustum is part. Then, by geometry, the height and diameter will be in direct proportion, and the solution is developed in equation (2) herewith.

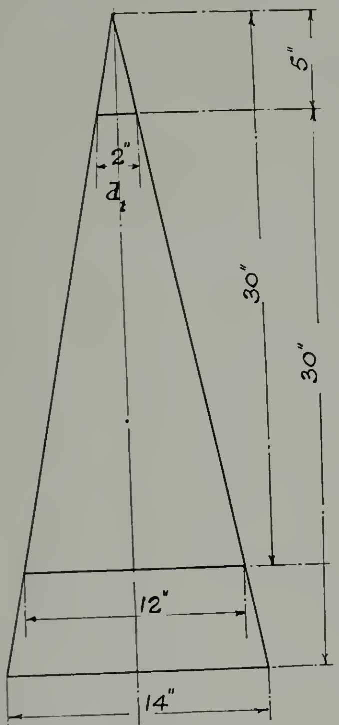


Diagram I.

The next problem is interesting, and "The Skipper" admits he had to look up the text book to refresh his memory before solving it.

3. (Dynamics). Two bodies, nearly in the same vertical line, are dropped, the higher six seconds before the lower. The height from which the higher is dropped is twice the height from which the lower is dropped. Find the heights if they reach the ground together.

For the benefit of such as may have forgotten, a body dropped accelerates at the rate of 32.2 feet per second, due to the force of gravity. Letting g = gravity, t = time and h = height, the final velocity is then g x t or v = gt at the end of t seconds. Its average velocity throughout the fall is $\frac{0 + gt}{2}$ or $\frac{1}{2}$ gt, and height is obviously velocity multiplied by time or h = $\frac{1}{2}$gt × t or $\frac{1}{2}$ gt^2. As $\frac{1}{2}$g is constant, it is evident that the height varies as the square of the time. Put into algebraic form the solution is worked out as in equation (3) herewith.

Now, you up and coming mariners, get busy and brush up on your mathematics and physics!

Deck Officers' Licenses for November

Name and Grade	Class	Condition
HONOLULU		
Carl H. B. Morrison, Master	OSS & OMS, any GT	O
Albert Gambo, 2nd Mate	OSS & OMS, any GT	O
James L. Reid, Chief Mate	OSS & OMS, any GT	RG
SEATTLE		
Kenneth S. McPherson, Master and Pilot	OSS, any GT	O
George E. Ritter, Chief Mate	OSS, any GT	RG
Bert A. Johnson, 2nd Mate	OSS, any GT	RG
JUNEAU		
Harry A. Clark, 2nd Mate	OSS & OMS, any GT	RG
Christen E. Trondsen, Master	OSS & OMS, any GT	RG
Aven M. Andersen, 2nd Mate	OSS, any GT	RG
SAN FRANCISCO		
Reginald E. Barrera, Master	OSS, any GT	RG
Sandrup Bernsen, Master	OSS, any GT	RG
Edward T. Collins, Master	OSS, any GT	RG
Robert L. Weber, Master	OSS, any GT	RG
Ralph C. Weymouth, Master	OSS, any GT	RG
Edmund Jensen, Chief Mate	OSS, any GT	RG
Allan T. Brown, Chief Mate	OSS, any GT	RG
Woodrow Wilson Herrington, 2nd Mate	OSS, any GT	O
Paul W. Dry, 2nd Mate	OSS, any GT	O
Wilfrid H. Gorman, 3d Mate	OSS, any GT	O
Emil Hrubik, 3d Mate	OSS, any GT	O
SAN PEDRO		
Austin Tomter, Master and Pilot	OSS, any GT	RG
Darrell L. Povey, Chief Mate	OSS, any GT	RG
Louis Seipel, Chief Mate	OSS, not over 500 GT	RG
Rolland C. Martin, 2nd Mate	OSS, any GT	O
Rector H. McCoskey, 2nd Mate	OSS, any GT	RG
Herbert G. Feagan, 3d Mate	OSS, any GT	O
Maurice V. Tunstall, 3d Mate	OSS, any GT	O
PORTLAND		
Alexander Christensen, Master	OSS & OMS, any GT	RG
Dana Dodge, Chief Mate	OSS, any GT	RG
William R. Wilson, 3d Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; RG is raise of grade; O is original license; OSS is ocean steamship; OMS is ocean motorship.

Solution From Correspondent

After the foregoing notes were written and just on the eve of going to press, "The Skipper" received a welcome letter from C. H. of San Francisco, and wishes to acknowledge it in this issue. Commenting on his remarks about problem No. 2, in which he stated the principle involved most accurately, but admitted he was "stymied" by the lack of an upper diameter for the frustum, he will be interested to see "The Skipper's" maneuver to obtain it.

(Page 82, please)

Marine Turbines To Deliver 8500 S.H.P. at 85 R.P.M.

Our illustrations show two shop views of the De Laval main propulsion turbines for the C-3 type cargo liners now building at the Moore Dry Dock Company to be allotted to the round-the-world services of the American President Lines.

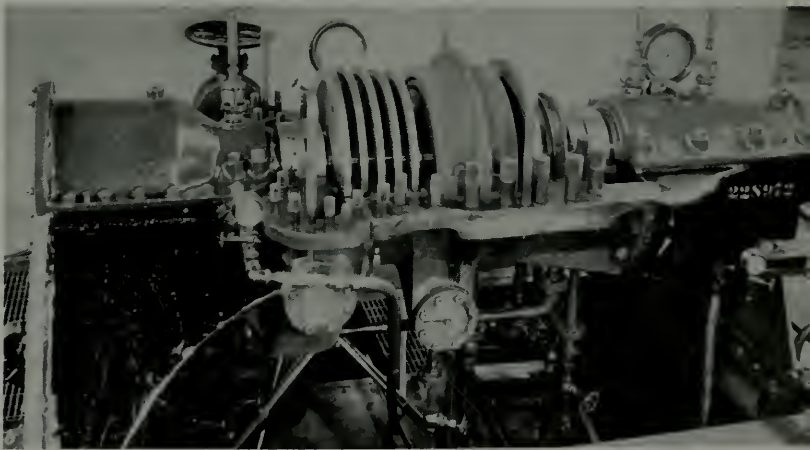
The main propulsion unit on these vessels comprises a high and a low pressure turbine cross compounded, and each connected through double reduction mechanical gearing to a single propeller shaft. This unit is designed to deliver 8500 horsepower at 85 r.p.m. of the propeller, when supplied at high pressure turbine inlet with steam at 440 pound gage pressure and 740° F. temperature, and when exhausting into a condenser maintaining 28.5" of vacuum. On test the unit must be able to generate 10 per cent overload continuously, and 25 per cent overload for two hours.

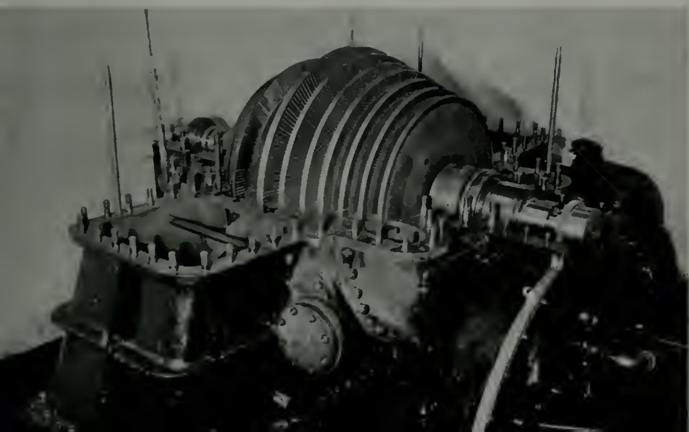
The high pressure turbine of this unit has 11 stages, and operates normally at 5012 revolutions per minute.

The low pressure unit has seven stages and three astern stages, and operates at 3459 revolutions per minute.

In connection with these turbines, De Laval Steam Turbine Company supplies also the double reduction gear sets. The low speed gear on these sets is among the largest ever installed on a cargo vessel. It has a pitch diameter of 153.75 inches, and is entirely of welded steel construction.

Nine identical units of this description are now in process of manufacture at the Trenton, New Jersey, shops of the De Laval Steam Turbine Company. Five of these units are for hulls building at the Federal Shipbuilding and Dry Dock Company, Kearny, New Jersey, and four for hulls building at the Moore Dry Dock Company, Oakland, Calif.





Upper, welded steel low-speed gear wheel for C-3s; 153.75" pitch diameter. Center, high-pressure turbine with cover removed. Lower, low-pressure turbine with cover removed.

American Export Line's cargo liner Exporter on her trial trip.

Care of Cargo at Sea

On New Export Cargo Liners

The annual meeting of the Society of Naval Architects and Marine Engineers at New York, December 1, 1938, introduced to the maritime world a masterly paper on the subject "Care of Cargo at Sea." This paper reviewed: the literature of the subject; recent experiments in control of ventilation, temperatures and humidity: and the practical applications leading to development of a new system and equipment known as the "Colby-Colvin Cargocaire." This system was developed during the past four years by the Cargocaire Division of the Research Department of the Colby Steel and Engineering Company, Seattle, Washington. A full abstract of the paper "Care of Cargo at Sea" appeared in Pacific Marine Review beginning in the December, 1938, issue and running serially to the issue for June, 1939.

The publicity given to this paper attracted so much attention and such a volume of inquiry that a separate organization was set up to handle manufacture and installation of the new system. This organization operates under the name Cargocaire Engineering Corporation, and has established an office and a technical staff in New York City.

The U. S. Maritime Commission is very much interested in this development and has committed itself to the extent of advising all shipowners to make a careful investigation of its merits in connection with building new or rebuilding old tonnage.

To the American Export Lines of New York goes credit for the first installation of this system on new overseas cargo carriers. This firm has ordered Cargocaire installation on each of the eight new fast freighters now under construction at the Fore River Plant of the Shipbuilding Division of the Bethlehem Steel Company.

After a careful study of the subject in connection with the peculiar needs of their trade routes, the technical staff of the American Export Lines selected a somewhat simplified arrangement of the "Cargocaire" System. Design and installation details were worked out with the engineering staffs of the Bethlehem Steel Company, Quincy, Massachusetts, and the Cargocaire Engineering Corporation, 15 Park Row, New York.

The first of these ships, S. S. Exporter, sailed from New York on her maiden voyage on October 5, and her performance in regard to care of cargo is being watched with keen interest by the ship operators of the world. The following description and illustrations show the details of this special application of "Cargocaire."

The installation in the Export ships is limited to uninsulated cargo holds Nos. 2, 3 and 6, and is designed to control the condition of the air in these holds. This is accomplished by the injection of treated (generally dry) fresh air into the cargo spaces, where it is immediately and intimately mixed with the air already present in those spaces.

There are two distinct parts in the Cargocaire system. One is the machinery for treating and injecting the air; the other is mixing and recirculating the air in the cargo spaces. This latter also permits of mechanical ventilation of these spaces with large quantities of outside untreated fresh air.

On the Export ships the air treating machinery, called the "Cargocaire Unit," is located in the refrigerating compressor room on the third deck. It consists of: two sets of Silica Gel filters and absorber beds fitted with cooling and heating coils; two Roots type blowers for moving the air; and a 15-horsepower Westinghouse motor for driving the blowers. The air intake receives air direct from the compressor room to avoid entrained salt water in stormy weather and clogging by ice and snow in the winter season. This is not recommended for all ships, but on the Export vessels there is a very ample supply of fresh air to the engine room and its auxiliary machinery spaces, and due to modern turbine design and electric drive for auxiliaries, there is practical elimination of water and oil vapor in the engine room air.

The mixing and recirculating arrangement consists of a pair of axial flow 24-inch diameter fans installed in the deck houses above each hold to be treated. Each of these fans is driven by a ¾-horsepower constant speed motor, and each will deliver about 4,000 cubic feet of air per minute. The fans with their motors are mounted inside of the vertical air ducts. The

resh air intakes are on top of the leck houses and are fitted with veather-proof mushroom cowls and vater-tight screwed covers. A cross luct is arranged between the two verical ducts inside each deck house, and hree-way dampers fitted at the ends of this cross duct. The three fans on he port side of the holds are reersible. The king posts serving these nolds are arranged as exhausts for the ir, and are fitted with weather-proof exhaust cowls and fire dampers.

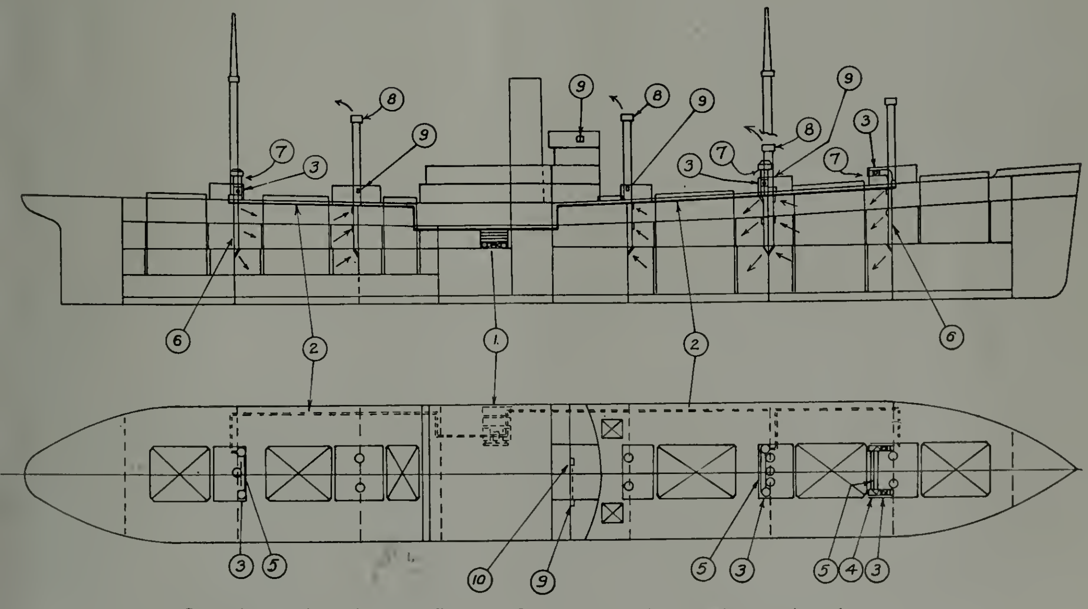
Each absorbing tower of the Cargocaire units consists of five horizontal ayers. Top to bottom, these layers are: in air filter; a salt water cooling coil, i steam heating coil; an absorber bed; wo pipe coils, as above; and a second absorber bed. The air flow is from op to bottom. When this air is cooled by the salt water coils, the moisture in he air is absorbed by the Silica Gel and the dry air forced by the one blower through the 8 inch ducts to the cargo holds under treatment. When he air is heated by the steam coils the Silica Gel heated by the hot air passing through drives out the absorbed moisture and the hot moist air is drawn off by the other blower and forced through a duct, to be discharged into the stack. By alternate heating and cooling, the Silica Gel can be used over and over again.

Two absorbing towers are used on the Export Line ships. While one is absorbing moisture the other is being regenerated. By means of valves and a four-way damper, all manually operated, the units are switched once every hour, or multiples thereof as the engineer finds is necessary.

In an exposed position near the bridge, but protected from ship's heat, sun radiation and spray by a special shelter, is installed a sensitive temperature and humidity element which transmits its readings electrically to a recording box inside the wheel house. This recorder is constantly under the inspection of the navigating officer. Other instruments in the deck houses indicate the temperature and humidity in the air exhausts from the cargo holds. Readings from these latter instruments are taken at least once every watch.

The judgment of the deck officer in comparing the condition of the air in the holds given by the deck house instruments with the temperature and humidity of the atmosphere and recirculating fan systems given by the bridge instrument will determine the operation of the Cargocaire unit in the holds. The correct procedure will depend on the nature of the cargo in the hold, on condition of the air in the holds, on the present condition of the outside air and the trend of change therein, and on the temperature of the sea water.

The maiden voyage of S.S. Exporter is to the Mediterranean and the Black Sea. Oliver D. Colvin, chief engineer of the Cargocaire Engineering Corporation, is accompanying the ship. He has taken with him a great number of instruments in order to test and check the performance of the installation, as well as to observe the changes going on in the atmosphere and in the cargoes. It is expected that the complete record data will be available immediately after the ship has returned, and that it will be of substantial interest to the ship fraternity. Unfortunately, the ship had been detained in Gibraltar for more than two weeks, preventing a report on the performance of the Cargocaire installation at the time of writing this article.



1. Cargocaire unit in engine room flat.
2. 8" round tubing for dry air.
3. 24"-diameter axial-flow fans.
4. 3-way dampers.
5. Cross duct.
6. Down-comers with connections to three ducts.
7. Fresh air intakes with water-tight cover.
8. Foul air exhausts with fire damper.
9. Instruments stations.
10. Temperature and humidity recorder in pilot house.

Tug Jane on trials. Note easy bow wave.

A Well-Balanced Tug Design

Pusey and Jones Deliver Two Unusual Vessels

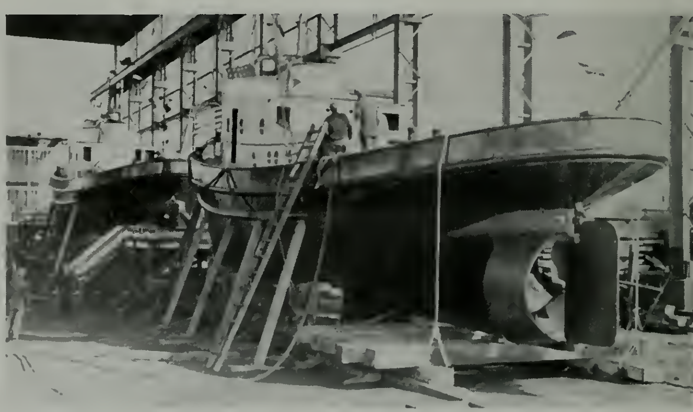
Although the new Enterprise-powered Curtis Bay Towing Company's 74-foot diesel tugs are the smallest craft ever to have been built by the Pusey and Jones Corporation, they symbolize advances in hull and machinery design for coastwise service that mark them as miniature giants in terms of the efficiencies that they have recently demonstrated in trials on the Delaware River. These are the first vessels in the United States to employ the patented Yourkevitch* hull form; the first towboats in the country to have been specially designed for Kort Nozzles; and they should be ranked among the top flight in pleasing appearance as well, for pains and ingenuity in every detail reflect a noteworthy effort toward perfection in smartness and space utility.

The lack of water disturbance at full speed, as may be seen from the accompanying illustration, shows how well the builder has minimized undesirable wave formations in his selection of patented lines, and the bow flare thus produced has already proved these craft the most seaworthy in Curtis Bay's "Silver Fleet." Both tugs operate at full power on their designed trim without the characteristic stern squat of

(*Designer of the hull form of the French transatlantic liner Normandie.)

Principal Particulars:

Length overall	74′ 0″
Length between perpendiculars	63′ 6″
Beam molded	18′ 9″
Beam overall	19′ 3″
Depth molded	8′ 9″
Mean draft	6′ 6″
Displacement tons, salt water	106.0
Registered gross tons	62.16
Registered net tons	42.00
Shaft horsepower at 320 r.p.m.	320
Speed, free, miles per hour	12.08

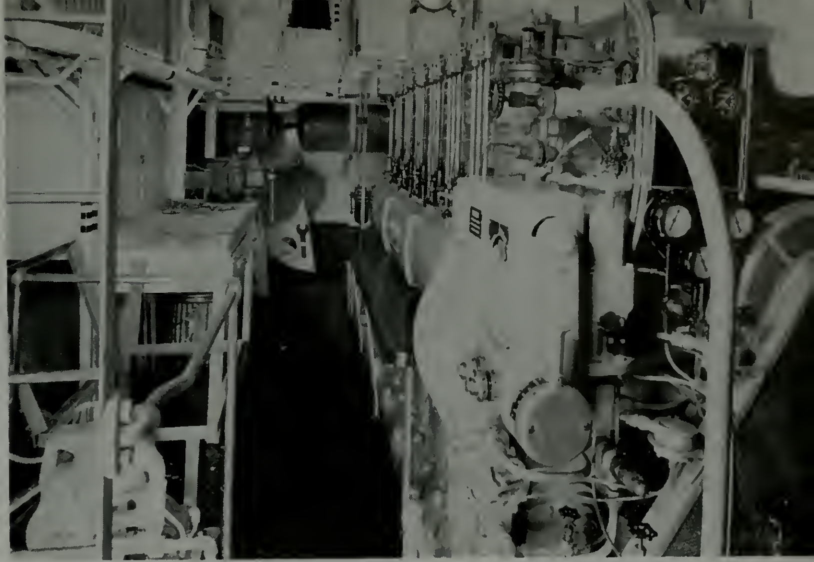


Tugs Jane and Marion on ways. Note Kort nozzle round propeller, and long run aft.

owboats. Considering the added vetted surface of the Kort Nozzle s a submerged appendage, a loaded lisplacement of 106 tons and the elatively large beam of 18' 9" on a vater line length of sixty-three feet, he speed of 12 miles an hour is nost commendable, especially with only 230 horsepower on the propeller. Furthermore on the speed trials here were 28 persons aboard, and ll tanks throughout were full except the peaks.

The flared entrance to the Kort Nozzles, developed by the Dravo Corporation for these boats, as well as the guiding apron, combine to effect a full, solid water flow which, upon expulsion through the back of he nozzle, very much like a hydraulic urbine, eases the burden on the propeller such as to make its pitch requirements less by at least 11 per cent. Hull lines were especially ined in contemplation of the nozzle characteristics, with the result that bollard tests by dynamometer have lemonstrated a towing pull of 13,400 pounds at 98 per cent of full engine power, as compared with 8,000 pounds usual from tugs of this size and power that are not equipped with Kort Nozzle. The towing pull thus produced is equivalent to 502 shaft horsepower, comparable to a step-up in towing efficiency of 47½ per cent, which is to say that the fuel consumption when towing at full power undergoes a marked reduction on the pounds-of-fuel-per-knot basis, not to mention the augmented towing speeds. The builder's semi-balanced rudder, operating n the Kort Nozzle flow, allowed the boats to run the length of the trial course without a hand being aid on the steering wheel, according to Edward A. Hodge, marine manager of The Pusey and Jones Corporation, who prepared the specifications and type plans for the ugs. At full speed astern, steering was accomplished with equal ease, and the same has been found true n docking at negligible headway with the propeller idle. Both boats are very sensitive in helm response and turn sharply at all speeds but without noticeable heel. From full ahead to stop only 19 seconds elapsed.

The hull and machinery were built to the highest classification and inspection of the American Bureau of Shipping, all shell plating being ⅜" in thickness, of welded construction throughout, as were the superstructure and decks. The elevated pilot house, despite its relatively high window sills, affords unobstructed vision through the use of especially narrow frames around the entire structure. Remote Enterprise engine control units, port and starboard, permit of handling the engines from alongside the steering wheel, which, through a 6 to 1 worm reduction, removes the need for any power-actuated steering mechanism.



Interior of engine room with 320-H.P., 6-cylinder Enterprise diesel engine.

Teak and mahogany have been used exclusively for floors, doors, trim and joiner work. The stainless steel galley table seats five persons, even with a General Electric refrigerator underneath it. A Shipmate 30" electrically-operated oil-burning range, flanked by stainless steel dressers and sink, has above it a dome within the false stack for trapping and exhausting hot air through an electric blower. Fresh air is introduced through two downcast air vents which form struts for the military type hinged mast. The deck lavatory has inside communication with all parts of the tug and is equipped with modern plumbing and hot and cold water supplied by a constant pressure system. Below the main deck there is a large officers' stateroom and a forecastle, each outfitted with four berths and lockers for a crew of eight.

One is very favorably impressed with the width of the decks along the house sides, and the liberal after deck area behind a towing bitt properly positioned well forward of the stern. Ample provision has been made for towing cable on portable galvanized steel subway gratings on the fantail; an electric 7½-H.P. capstan being employed for rope handling. The single davit, with its long outreach, lends a smart appearance to the ship as a means of handling the metal lifeboat, chocked over the engine room skylight.

In a machinery space having full headroom and unobstructed passageways, there is an Enterprise 6-cylinder, 4-cycle, mechanical injection, direct reversible modern diesel engine which develops 320 shaft horsepower at 320 revolutions per minute. The main propulsion power is transmitted through a Kingsbury type GF-13½ thrust bearing, the stern tube bearings being of Cutless rubber in bronze shells. The propeller is of the three-bladed type, made of cast steel. The diesel engine is cooled by a closed circulating system, through a Davis heat exchanger, under pressure from attached fresh and salt water pumps. A double-bottom tank contains a ton of fresh water reserve for this system. Fifty-four cubic feet of

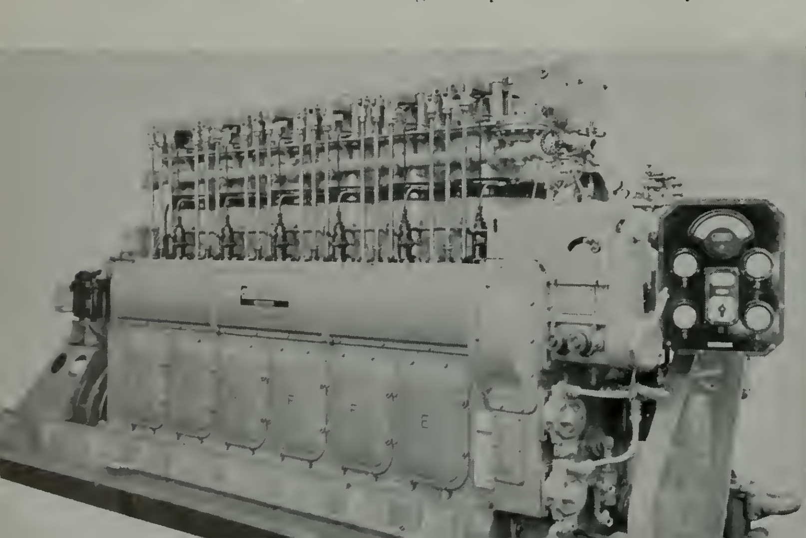
starting air at 250 pounds pressure is contained in three air tanks that can be separately cut-in from a manifold near the engine throttle, thus assuring the uttermost in reliability and control. One attached and one independent air compressor are employed for air replenishment.

Lubricating oil purification is effected by a No. 35-13 DeLaval centrifuge, fitted with electric heater and transfer pumps that are capable of handling 30 gallons per hour. A single cylinder, 15 H.P., four-cycle full diesel Stover engine serves as a prime mover for a 5-KW, 130-volt direct current generator, the 26-cubic-foot independent air compressor and a 90 G.P.M. rotary fire and bilge pump. There is also a 5 KW generator, belt-driven from the main engine flywheel. Both "float" in the 200-ampere-hour Exide storage battery circuit, which supplies power to the ship's auxiliary motors, to the 7½-H.P. Lidgerwood deck capstan and to the lighting circuits, through voltage regulators. The wiring is of lead and armored cable installed to A.I.E.E. standards. All illumination is of the non-glare, indirect type, except in the engine room. The tugs are heated by a type 500 York oil-fired boiler, equipped with a Westco 3 G.P.M. condensate pump in the return line, thereby allowing all radiators to be kept as low in the hull as desired.

The fuel bunkers are built-in and have a capacity of 1600 gallons, thus offering a 1,000-mile cruising range. The fresh domestic water capacity is 300 gallons, and the peak tanks are used for salt water trimming ballast. Standard equipment includes: a 500-watt searchlight, electric fans, air whistle, electric tachometers, Maxim silencers, engine oil and water alarm systems and "ahead" and "astern" indicator signals in the wheelhouse. A switchboard centralizing all circuits, a signal light tell-tale, 11" electric navigating lights, lubricating oil supply and sump tanks, filters, strainers and fully equipped gage boards.

The contract price for these two diesel tugs was $200,000, and quite significant is the announcement by Captain H. C. Jefferson, president of the towing company, that the Yourkevitch hull form and the Kort Nozzle have been incorporated in the new lines of two 600-horsepower, 95-foot steel tugs just awarded to The Pusey and Jones Corporation to design and build for the Donaldson Towing Company of Baltimore at a total contract price of $400,000. These craft will be delivered in mid July, 1940, and should prove thoroughly representative of the efficiencies and attractiveness that characterize the tugs Jane and Marion, which are unexpectedly doing the work of the larger tugs of the "Silver Fleet." Mr. Hodge will again be given a free hand in the detail design development and styling, which conforms closely with Captain Jefferson's policy of attempting well-thought-out innovations.

Six-cylinder, four-cycle, mechanical injection, directly-reversible Enterprise diesel engine of the tug Jane. This prime mover delivers 320 shaft horsepower at 320 revolutions per minute.



1939 G. E. Progress

By Guy Bartlett

High lighting conspicuous developments of the year in marine equipment progress was the outstanding fuel consumption record of the Challenge and the Red Jacket, which, on official trial run, showed a fuel rate of 0.545 lb. per shaft H.P. for all purposes (referred to 18,500 Btu/lb. fuel), believed to set a new world's record. They are two of five cargo vessels completed during the year by Federal Shipbuilding and Dry Dock Company in an extensive construction program of the U. S. Maritime Commission. They are capable of developing 16 knots, and all have geared turbine propulsion.

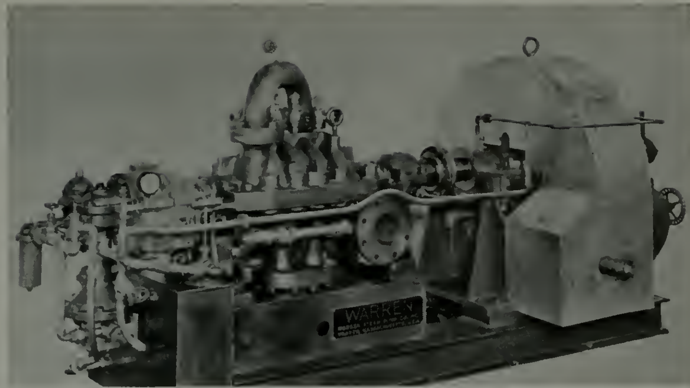
They are single-screw, 6000-H.P., 92-r.p.m., with steam conditions of 440 lb. 740 F. total temperature, and 1½ in. absolute back pressure. A sixth vessel is nearing completion, and Federal is starting construction of eight more such ships, with propulsion equipment duplicating the first six.

During the year, Federal also completed two of three high-speed tankers having geared turbine propulsion. One was the S. S. Markay; the other, turned over to the Navy Department, was named U. S. S. Neosho. Faster and more powerful than usual tankers, each has twin-screw drive with one 6750-H.P., 96-r.p.m. geared turbine per screw. Steam conditions are 425 lb. 740 F., and 1½-in. absolute back pressure.

Geared turbines will also be used for three combination cargo and passenger vessels being built by Bethlehem Steel Corporation, Shipbuilding Division, for Mississippi Shipping Company. The vessels, to go into operation in 1940 between New Orleans and the East Coast of South America, will have geared turbines rated 7800 H.P., 105 r.p.m., and steam conditions of 425 lb., 740 F., and 1½-in. absolute back pressure.

Several ship propulsion equipments were furnished, consisting of d-c generators driven by diesel engines, furnishing power to motors geared to the propellers. One of the unusual features was engine-starting from a storage battery, using the generators as series motors, a short-time-rated series field being provided for this purpose.

Modern Feed Pumps *for* High-Pressure Marine Boilers



Warren Steam Pump Co. feed pump. 2", 600 lbs., 2 stage, turbine drive.

Our illustration is taken from a photograph of a Warren 4-stage turbine drive feed pump mounted with its turbine on a structural steel base ready for installation on shipboard. Forty-six of these pumps have been or are being built by the Warren Steam Pump Company for various ships in the U. S. Maritime Commission program.

It is a 2" four-stage pump with impellers of the single inlet type. Two impellers face in one direction and two in the other direction, giving hydraulic balance. The first stage impeller is located at one end of the pump and the second stage impeller on the other end, this design and arrangement of impellers having been used in Warren boiler feed pumps for the past fifteen years.

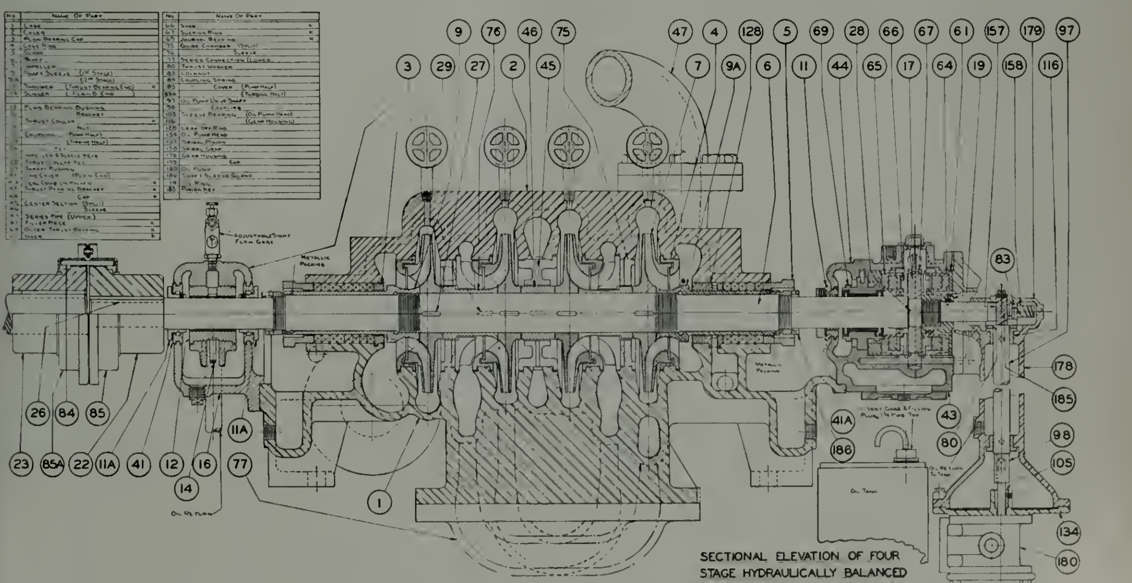
This results in the practical elimination of excessive unbalanced end thrust, and the high pressure stuffing box carries only the pressure of the first stage. To further reduce the pressure on the stuffing box packing, a pressure breakdown sealing ring is installed in the stuffing box and a bypass line connected to the pump suction nozzle.

The pump casing, which is of cast steel, is divided on a horizontal plane, with the suction and discharge nozzles cast integral with the bottom half. The bearing housings are also divided on a horizontal plane and are fitted with renewable split shell, babbitt lined bushings.

The trust bearing is of the Kingsbury type, manufactured by the Kingsbury Machine Works.

All bearings are assured of a continuous supply of oil from a positive pressure lubricating system. The oil pump is of the rotary type, driven from the main pump shaft, and is located below the level of the oil in the tank, thus insuring an immediate and continuous supply of oil to all bearings. A hand oil pump is fitted for use in starting. An oil cooler and filter are fitted in the oil line between pump and bearings.

Fourteen of these pumps are built or building for seven American Export Line freighters, each with a capacity of 210 g.p.m. against a discharge pressure of 575 lbs. Thirty-two additional pumps are on order for the three new combination freight-and-passenger steamers building for Mississippi Shipping Co., seven C-3 combination freight-and-passenger steamers for American President Lines and for six vessels for Seas Shipping Co. (Robin Line).



SECTIONAL ELEVATION OF FOUR STAGE HYDRAULICALLY BALANCED CENTRIFUGAL PUMP TYPE-4HK 2" SIZE SHOWN

A Stronger— Yet Lighter— Cargo Winch

American winches on after deck, S.S. Red Jacket.

Out of 129 C Type cargo vessels ordered so far by the Maritime Commission, at least 79 are to be equipped with American Cargo Winches.

The reason for this preference is that these cargo winches are truly modern, the product of efficient engineering design plus the advantages of modern structural steel and electric welding technique.

The latest methods and most modern machinery for shaping and welding heavy steel plates, plus the widest engineering knowledge and experience, have enabled the American Hoist and Derrick Company to design and build a vastly-improved cargo winch. This winch is stronger than old style winches, yet is much lighter in weight, as the bed is built up of electric welded steel shapes instead of heavy castings.

Maximum strength and rigidity without excess weight are obtained by this method. Not a pound of useless metal is permitted on these modern cargo handlers; every bit of material is put where it will function on the job, and not as nonrevenue deck load.

American Cargo Winches have a safety factor of from 2½ to 4 on the elastic limit of materials used, depending upon the application to which the hoist is put. Overloads within reason are easily taken, with no distortion or damage.

A foot brake, heavy enough to take the full overload, is provided to comply with regulations.

An outstanding characteristic of these cargo winches is absence of gear noise. This is accomplished by the use of a herringbone gear drive between the motor and intermediate shaft on the Model 40 and 41 winches. On winches Nos. 42 and 43, designed for the C-3 type of ship, herringbone gearing is used throughout. These winches are absolutely noiseless except for the hum made by the motor. They are ideal for combination cargo and passenger vessels or for passenger liners.

All bearings are bronze bushed. Bushings are extra heavy, are provided with shims for quick adjustment, and are scientifically grooved to provide thorough distribution of lubricant.

A very effective rope guard is provided to keep the cable from becoming loose and interfering with the smooth operation of the winch.

Gantry-Mounted Shipyard Revolvers

Streamlined for the high pressure shipbuilding schedules of today, the American Shipyard Revolver has a great reach, adequate power and exceptional flexibility. The improved hook roller design makes the tower an integral part of the crane and permits the weight of the tower to be used in computing the stability of the revolver. The perfected American design makes possible a lighter machine with no sacrifice of strength or stability, and the resultant lowering of wheel loads is an important advantage.

Model R-20 Revolver.

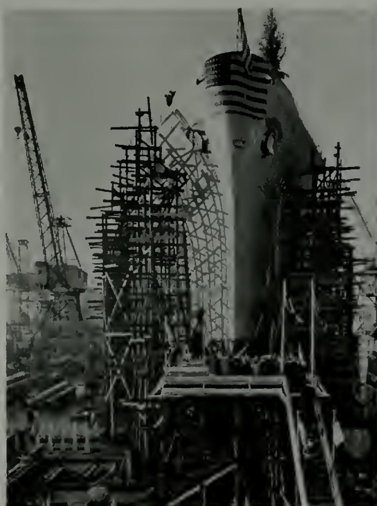
This shipyard revolver embodies the best and most advanced developments in modern design and construction. It is more compact, with a shorter tail swing, than most cranes sold for this service. The rollers and roller path are flame hardened to intensify their wear-resisting qualities. In short, it is a most efficient and durable material-handling tool for shipyard use. This crane is available in three models.

Model R-10 — Capacity: 14,500 pounds at 80 feet radius; 55,000 pounds at 25 feet radius. Std. boom length 85 feet, center to center of pins; 10 feet removable section.

Model R-15 — Capacity: 19,500 pounds at 90 feet radius; 90,000 pounds at 30 feet radius. Std. boom length: 100 feet, center to center of pins; 25 feet removable section.

Model R-20 — Capacity: 19,500 pounds at 125 feet radius; 100,000 pounds at 45 feet radius. Std. boom length: 125 feet, center to center of pins; two 25-foot removable sections.

On the Ways—
SHIPS IN THE MAKING
LATEST NEWS FROM AMERICAN SHIPYARDS



Maritime Commission Launchings

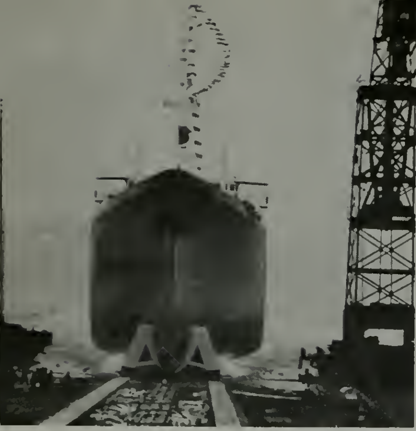
Maritime Commission's shipbuilding program is getting into full swing now, and launchings are more frequent. As of December 28, a total of 141 vessels had been contracted for, and of this total 21 had been delivered and 36 had been launched. Of these 36 launchings, 7 occurred during December.

MORMACLAND, C-3, 7,680 tons, was launched at 3 p. m., Thursday, December 14, at the Sun Shipbuilding and Dry Dock Company, Chester, Pennsylvania, under the spon-

Sea Star Launch

At the yard of Moore Dry Dock Company, Oakland, California, on December 22, at 8:30 a. m., Mrs. R. J. Welch, wife of Congressman Richard J. Welch, broke a bottle of California champagne over the prow of a big C-3 cargo vessel and christened her Sea Star. This sponsorship was a fitting tribute to the congressman who more than any other one person is responsible for the 6 per cent differential for Pacific Coast shipbuilders that enabled them to secure the present contracts.

Above is the prow of Sea Star ready for launching, and the sponsor and her good husband. At left, the beautifully-molded stern of Sea Star takes the water.



Launching of S. S. Delbrasil on December 16 at Sparrows Point Yard.

sorship of Miss Anne Elizabeth Bailey, daughter of Senator Bailey, chairman of the Senate Commerce Committee.

Mormacland is scheduled for the American Republics Line service to South America.

SANTA TERESA, C-2, 6,085 gross tons, was launched at 12 noon Friday, December 15, at the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia, under the sponsorship of Miss Jean Roig, daughter of Vice-President Harold Roig of W. R. Grace and Company; scheduled for service on the Grace Line to South America.

FLYING FISH and **COMET**, both C-2, 6,085 gross tons each, were launched at 12:30 p. m. Saturday, December 16, at the Federal Shipbuilding and Dry Dock Company, Kearny, New Jersey, under the respective sponsorships of Mrs. Roberta Wiley Childs and Mrs. Elisabeth Wiley Robb, daughter of Commissioner Henry A. Wiley, Rear Admiral, U. S. N. (ret.). Both ships are scheduled to be used on the American Pioneer Line service to the Far East and Australia.

DELBRASIL, Mississippi Shipping Company design, 8,300 gross tons, was launched at 11 a. m. Saturday, December 16, at the Bethlehem Steel Co. yard at Sparrows Point, Maryland, under the sponsorship of Mrs. Maria Martins, wife of the Brazilian ambassador. This steamer is scheduled to be placed in service on the Delta Line from the Gulf to the east coast of South America.

SEA STAR, C-3 type steamer, was launched at 8:30 a. m. Friday, December 22, at the Moore Dry Dock Company, Oakland, California, under the sponsorship of Mrs. Richard J. Welch, wife of Representative Welch of California.

EXCHANGE, Export Steamship Co. design steamer, was launched for the American Export Lines at 11:45 a. m. Thursday, December 28, at the Fore River, Quincy, Mass., yard of Bethlehem Steel Corp., under the sponsorship of Miss Agnes S. Gillespie, daughter of H. M. Gillespie, vice-president and secretary-treasurer of American Export Lines.

SHOOTING STAR, a 6,194 gross ton, C-2 type ship, will be launched by the Tampa Shipbuilding and Engineering Company, Tampa, Florida, on January 10, 1940, under the sponsorship of Mrs. Fred P. Cone, wife of Governor Cone of Florida. Shooting Star, the second C-2 to be launched at the Tampa yard, is scheduled for service on the American Pioneer Line to the Far East and Australia.

Commercial Iron Works Launches Two

The Commercial Iron Works of Portland, Oregon, have been busy turning out workboat hulls for the new river traffic on the Columbia. On December 16 they launched a 200,000-gallon capacity, all-welded steel oil barge. This hull is 144 ft. long, 35 ft. beam and 8 ft. depth.

On December 30, Commercial Iron Works launched an all-welded steel whirley derrick barge.

Harbor Boat Building Launches Tuna Clipper

On December 10, at 10:30 a. m., the Harbor Boat Building Company of San Diego launched the Madeirense, a 500-gross-ton tuna fishing boat. She is 125 feet long, 28 feet beam and 14 feet depth. Powered with a 600 H. P. Fairbanks Morse diesel engine for propulsion, she will have 12 knots set speed. Equipped with quick-freezing refrigeration and large capacity bait tank circulating pumps, the Madeirense carries three electric generating sets, with a total engine capacity of 450 H. P. Her total cost is $185,000. She will be operated by Madeirense, Inc., of San Diego.

Electric Boat Company Launches Sub—Lays Keel

At Groton, Connecticut, on December 20, the Electric Boat Co. launched the 1475-ton submarine Tambor (SS198) for the U. S. Navy.

On December 27 they laid a keel for a sister submarine, to be named Gar (SS206).

As of January 1, 1940, Electric Boat had five submarines under construction and two more under contract. An eighth, the Sealion (SS195), was delivered on November 27, 1939.

Lake Union Delivers Snagboat

Lake Union Dry Dock and Machine Works, Seattle, Wash., on January 1 delivered to the U. S. Engineers a sternwheel steam snagboat, the Preston.

Ingalls Busy on Many Hulls

In addition to the eight C-3 Maritime Commission cargo vessels contracted in March and September, 1939, the Ingalls Shipbuilding Corporation, with yards at Pascagoula, Miss., and Decatur, Ala., has several hulls under construction, including:

Two flat deck streel barges 105′ x 32′ x 7′ for the West Virginia Pulp and Paper Co. of New York; and

One ferry 105′ x 35′ x 5′ for the Parish of Plaquemines, La.

All three of these vessels are for delivery on March 1, 1940.

Manitowoc Gets Car Ferry

The Manitowoc Ship Building Co. of Manitowoc, Wisconsin, reports a contract for one steel twin screw car ferry 406′ x 57′ x 23.5′.

Newport News Delivers a C-2

On December 4 the Newport News Shipbuilding & Dry Dock Company delivered to the Grace Line, Inc., the Maritime Commission C-2 type cargo steamer Stag Hound.

Federal Delivers Large Tanker

The fast national-defense feature tanker Esso Trenton was delivered to the Standard Oil Company of New Jersey by the Federal Shipbuilding and Dry Dock Company on December 15.

The C-2 cargo vessel Lightning, finished to original specifications by Federal, and delivered to the Atlantic Basin Iron Works, New York, for installation of cargo refrigeration, was delivered by that firm on December 21 to the American Pioneer Line for use on their service from American North Atlantic ports to Far East, Australia and New Zealand. This is the twenty-first vessel completed in the Maritime Commission program.

Defoe Gets Sub Chaser

The Defoe Boat and Motor Works, Bay City, Michigan, report contract for another sub chaser for the U. S. Navy. This boat, designated P. C.-452 by the Navy (the builders' hull number 167), will be: of steel construction; driven by General Motors diesel engines; and 174 feet long.

Dravo Corporation Building 61 Hulls

The Dravo Corporation of Pittsburgh operates three building yards and reports that it has under construction 61 steel hulls, aggregating 35,160 gross tons. These hulls are of various types, including: flush deck cargo box barges; covered cargo barges; welded steel coal barges; automobile carriers; diesel drive towboats; a 25-ton floating crane (for U. S. Navy Yard, Mare Island, Calif.); oil barges; and a caisson for the Panama Canal.

Maryland Completes Dredge Reconditioning

Maryland Drydock Co., Baltimore, Maryland, on December 14, 1939, completed an extensive overhaul and repair job on U. S. Engineers dredge Atlantic. The work included: the installation of additional settling bins; new twin rudders; new lifeboat davits; and extensive hull repairs and alterations. Total cost, $110,000.

Pusey & Jones Delivers Two Tugs

On December 2 and December 9, respectively, the Pusey & Jones Corporation of Wilmington, Delaware, delivered tugs Jane and Marion to the Curtis Bay Towing Company. These are specially-designed streamlined steel hull seagoing tugs, each powered with a 320-shaft-horsepower Enterprise diesel engine. A fully-illustrated description will be found elsewhere in this issue of Pacific Marine Review.

This shipyard reports a busy year ahead, having recently secured contracts for the following:

Hull 1074, an auto and passenger ferry for the Virginia Ferry Corporation; 300 feet long, 65 feet beam and 20 feet depth; powered with a 3600-horsepower Una Flow steam engine for a speed of 16 knots; and to be delivered in November, 1940, at a cost of $1,000,000.

Hulls 1075 and 1076, two C-1 type turbine drive cargo steamers for U. S. Maritime Commission, to be delivered in January and March, 1941, at a total cost of $1,928,00 each.

Hulls 1077 and 1078, two tugs for the Donaldson Towing & Lighterage Co.; 95 feet long by 24 feet beam by 14 feet depth; each to be powered with a 600-horsepower Una Flow steam engine for 13 knots speed; to be fitted with Kort nozzles; and to be delivered in July and August, 1940, at a total cost of $200,000 each.

Sun Delivers Mormacpenn

On December 31, nearly three months ahead of contract date, Sun Shipbuilding and Drydock Company delivered to the Moore-McCormack Lines, Inc., their Hull No. 182, the Mormacpenn, first of a series of four C-3 combination cargo and passenger

DELIVERIES MADE TO DATE

M. C. Hull Number	Type	Builder	Name	Date of Delivery	To Whom Delivered
2	Tanker	Sun S&DD Co.	CIMARRON	2/6/39	Navy Dept.
3	Tanker	Sun S&DD Co.	SEAKAY	3/23/39	Standard Oil Co. of N.J.
4	Tanker	Sun S&DD Co.	ESSO NEW ORLEANS	4/14/39	Standard Oil Co. of N.J.
5	Tanker	Federal S&DD Co.	MARKAY	5/25/39	Standard Oil Co. of N.J.
6	Tanker	Federal S&DD Co.	NEOSHO	8/4/39	Navy Dept.
7	Tanker	Federal S&DD Co.	ESSO TRENTON	12/14/39	Standard Oil Co. of N.J.
8	Tanker	Beth. Steel Co. - S.P.	SS PLATTE	12/1/39	Navy Dept.
14	C-2 Cargo	Federal S&DD Co.	CHALLENGE	7/10/39	American-Hampton Rds. Line
15	C-2 Cargo	Federal S&DD Co.	RED JACKET	9/6/39	Atlantic Basin Iron Works (refr.)
15	C-2 Cargo	(Atlan.BIW-Car.refrig.)	RED JACKET	11/18/39	Moore-McCormack Lines
16	C-2 Cargo	Federal S&DD Co.	LIGHTNING	9/26/39	Atlantic Basin Iron Works (refr.)
17	C-2 Cargo	Federal S&DD Co.	FLYING CLOUD	11/1/39	Moore-McCormack Lines
18	C-2 Cargo	Sun S&DD Co.	DONALD McKAY	6/27/39	Moore-McCormack Lines
19	C-2 Cargo	Sun S&DD Co.	MORMACHAWK	7/27/39	Moore-McCormack Lines
20	C-2 Cargo	Sun S&DD Co.	MORMACWREN	8/18/39	Moore-McCormack Lines
21	C-2 Cargo	Sun S&DD Co.	MORMACDOVE	9/21/39	Moore-McCormack Lines
26	C-2 Cargo	Newport News S&DD Co.	NIGHTINGALE	10/30/39	Grace Line, Inc.
27	C-2 Cargo	Newport News S&DD Co.	STAG HOUND	12/4/39	Grace Line, Inc.
30	C-2 Cargo	Sun S&DD Co.	MORMACGULL	10/13/39	Moore-McCormack Lines
31	C-2 Cargo	Sun S&DD Co.	MORMACLARK	11/29/39	Moore-McCormack Lines
34	Cargo	Beth. Steel Co., F.R.	EXPORTER	9/28/39	American Export Lines, Inc.
35	Cargo	Beth. Steel Co., F.R.	EXPLORER	11/16/39	American Export Lines, Inc.

Deliveries of Maritime Commission program ships to December 21.

TONNAGE FIGURES U. S. M. C. STANDARD CARGO VESSELS

Tonnage	C-1 Steam Full Sct.	C-1 Steam Shelter Dk.	C-1 Diesel Full Sct.	C-1 Diesel Shelter Dk.	C-2 Steam	C-2 Diesel	C-3 Steam	C-3 Diesel
Displacement	12,875	11,100	12,875	11,100	13,900	13,900	17,600	17,600
Hull & Machinery	3,800	3,600	3,900	3,700	4,933	5,100	5,680	5,880
Total Deadweight	9,075	7,500	8,975	7,400	8,967	8,800	11,920	11,720
Cargo Deadweight	7,815	6,240	8,015	6,440	7,400	7,590	9,900	10,100
Gross Measurement	6,750	5,028	6,750	5,028	6,194	6,194	7,680	7,680
Net Measurement	4,800	2,820	4,800	2,820	3,688	3,688	4,550	4,550

Note: Most of these figures are taken from Maritime Commission releases. A few are estimated. There will be considerable variation from this table in the combination passenger and cargo C-3 types. Figures as given represent the standard cargo ships as closely as can be approximated at this time.

motorships powered with Busch Sulzer diesel engines.

Brooklyn Navy Yard Delivers Light Cruiser

On December 15 Brooklyn Navy Yard delivered U. S. CL50, the light cruiser Helena, 600 feet long by 61 feet 7¾ inch beam, with 10,000 tons displacement. This leaves Brooklyn with a 35,000 ton battleship on the ways, expecting to be launched on March 1, 1940; and another battleship on order, keel for which will be laid on the ways vacated March 1. Estimated delivery dates are October 15, 1941, and August 1, 1943.

Literature of The Industry

Arc Welding Electrodes, GEA-1546F, is a new bulletin on the selection of General Electric arc-welding electrodes, now available.

Prepared as a guide for the proper selection of electrodes, the publication also gives important suggestions on welding technique with different types of electrodes, and presents some of the factors influencing their choice. Complete descriptions are given of the 20 types of General Electric electrodes, their applications, sizes, recommended currents, arc-voltages and identification.

Profusely illustrated with application photographs, this 40-page publication contains characteristics of deposited weld metal, charts of joint forms and positions, and a handy estimator for electrode quantities.

The Babcock & Wilcox Tube Company, Beaver Falls, Pa., have issued their *Technical Bulletin No. 12-A, Condensed Technical Data on High-Temperature Steels,* containing revised useful information data on B&W seamless alloy tubes and pipe for high pressure and high temperature services.

Curves and a complete tabulation give: analysis, applications, minimum physical properties, creep strength, short time tensile strength, oxidation resistance, corrosion resistance, temper embrittlement, working qualities, and approximate relative cost for 15 different materials.

The bulletin may be had by giving company connections.

Gearflex Couplings. This catalog, No. 443, newly issued by Farrel-Birmingham Company, Inc., explains the function of a flexible coupling, and describes how Farrel Gearflex Couplings compensate for parallel or angular misalignment or a combination of both, illustrating the details of design and construction with a number of fine half tone plates. It gives the applications, ratings, dimensions and weights of the various types of flexible couplings manufactured by Farrel-Birmingham Company, illustrated with numerous charts and diagrams. Photographs of a number of coupling installations are also contained in this catalog, and full information is given on such subjects as service factors and their use in making a selection of a flexible coupling for any particular application, as well as information necessary in ordering, and other data.

Containing 44 pages, handsomely printed in blue and black and with a black and silver embossed cover, Catalog No. 443 is a reference book of much practical value. Copies may be obtained by addressing Farrel-Birmingham Company or Pacific Marine Review.

New Sperry Headquarters

J. F. McConkey, West Coast manager, Sperry Gyroscope Company, Inc., has recently moved his San Francisco hetadquarters from 58 Main Street to 218 Howard Street to provide room for the expansion of Sperry business on this coast.

At the new location, in addition to more spacious and more individual offices and reception rooms, there is a large room for the ship officers' Gyro school and a large stockroom and shop.

The new offices are furnished in good taste, are well lighted, and have adequate heating and ventilation equipment. The location is close to the business district and to cross-town and transbay transportation.

INSTRUCTION IN VISUAL SIGNALING

Reports that merchant vessels have failed to answer visual signals from Navy and Coast Guard ships have led the United States Maritime Commission to offer courses in that field to junior licensed deck officers of the American merchant marine.

Instruction will be given by U. S. Coast Guard personnel at Maritime Commission District Offices in New York, San Francisco and New Orleans, and at Coast Guard stations for vessels not calling at these ports.

In a letter to all United States steamship companies, Admiral Emory S. Land, Commission chairman, asked cooperation in training junior officers and deck cadets and deck cadet officers.

Cadet officers are probably qualified at semaphore, flashlight and international code flags, but Admiral Land said:

Nevertheless, instructions have been given to the District cadet training instructors to check on their proficiency at the time of their appointment and while in service.

Cadets are given an intensive course in communications during three years of their training. Visual signaling is commenced at the shore receiving station, and at the end of their first year cadets must be able to transmit and receive semaphore and blinkers at a rate of at least eight words per minute

The cooperation requested by Admiral Land included:

1. Instructions to masters to permit cadet officers and cadets to practice and use visual signaling equipment until they are rated proficient.

2. Permission for cadet officers and cadets to spend half of each day in any of the three ports with the cadet instructor for instruction and tests, visits to be discontinued when proficiency is attained.

3. Instruction to masters to use cadet officers and cadets for visual signaling whenever possible.

4. Requirement that, *an adequate number of your junior licensed deck personnel take the training while in port at New York, San Francisco and New Orleans.*

Admiral Land told the companies that the reports of both failure to answer and of lack of proficiency in answering visual signals indicated a condition which "may prove of serious consequence."

Group Insurance Effects Savings

General Electric employees insured through the free and additional group life insurance plans of the company were saved approximately $190,000 last year through the suspension of contributions to the additional plan during November and December. This sum is equivalent to 16⅔ per cent of the yearly contribution rate. It is also twice the sum saved employees in 1938, when payments were suspended for the month of December only.

Payment of this dividend was made possible through favorable mortality experience during 1939.

Bureau Studies Fusion Welding

Fusion welding has become increasingly important in the shipbuilding industry during recent years, and has displaced the use of rivets in many new marine construction methods.

Consequently, in line with the Commerce Department's policy of keeping abreast of new developments that affect its work, a group of inspectors of the Bureau of Marine Inspection and Navigation met in Cleveland, Ohio, from December 4 to 11 to undergo a brief and intensive study course in recent innovations of this rapidly-developing science.

The Bureau has set high standards in its welding code governing work done on merchant marine vessels, and qualification standards for personnel engaged in marine welding operations are equally stringent. Participation in courses of this nature is designed to keep the Bureau adequately staffed with experts capable of subjecting marine welding work to rigid inspection.

The group, headed by James W. Wilson, Senior Marine Engineer of the Bureau, not only engaged in extensive discussions and studies but also visited several large plants in Cleveland and vicinity and observed the application of welding in actual operation.

All phases of welding as applied to marine construction were studied, including flame cutting, gas welding, submerged melt electric welding, metallic arc welding, non-destructive tests of welds, stress relieving of welds, electric resistance butt welding and welding for both new construction and repairs.

STEADY AS YOU GO!

(Continued from page 68)

In his solution of problem No. 3, my correspondent arrives at practically the same solution as given, but is to be complimented for remembering his mathematics and solving the quadratic equation $t^2 - 24t + 72 = 0$ by the much better "completing the square" method, which I quote:

$$t^2 - 24t + 72 = 0$$

adding 72 to each - - -

$$72 = 72$$

$$t^2 - 24t + 144 = 72$$

$$(t - 12)^2 = 72$$

$$t - 12 = \pm \sqrt{72}$$

Therefore, $t = 8.485 + 12 = 20.485$ secs.

or, $t = -8.485 + 12 = 3.515$ secs.

With reference to the alternative solution, 3.515 seconds, our mathematically-minded correspondent gives the following interesting workout:

"The root 3.515 seconds does not fit into the problem for the restriction that top mass is released six seconds before lower mass; but it can be made to fit into a problem in which the *sum* of the time of the top body falling and lower body falling is six seconds.

t top = 3.515 sec. t lower 6 — 3.515 = 2.485 sec.

$$h = \tfrac{1}{2} \times 32.3 \times \overline{3.515}^{\,2} = 199 \pm \text{ feet}$$

$$h/2 = 2 \times 32.2 \times \overline{2.485}^{\,2} = 99.45 \pm \text{ feet.}$$

Therefore, root t = 3.515 means that top body would fall 199′, and lower body would be released 3.515 — 2.485 or 1.030 sec's. later."

Regarding problem No. 1, published in the November issue, he remarks:

"The minus root, x = (-11), means that if the conditions of the problem were reversed, that is, if speed were one knot less and time one day longer, then the answer would be eleven knots. The other root now would be (-10)."

Of the two solutions to a quadratic equation, it is usually obvious which is the practical one to use. Some purely hypothetical set of conditions has generally to be imagined to meet the other. "The Skipper" does not feel the mathematical urge to go farther into this at the present time. To conclude his letter, our correspondent facetiously remarks:

It would be appreciated by many of the "present day" mates and engineers —if you could publish in your column a system of calculating by which 3 plus 2 could be made to equal 10. Such a system would fit into their ideas of how their "overtime" should be reckoned.

C-2 Clipper Sponsors

Surprise

Launched October 5, 1850, from the yard of Samuel Hall, Surprise was the first clipper ship constructed in East Boston. She was modeled by Samuel H. Pook and built for the China trade to the order of A. A. Low and Brother, New York. Her construction was supervised by the celebrated sailing ship skipper, Captain Philip A. Damaresq, who was to command her for the first two round voyages.

Dimensions were: length on water line, 183.3 feet; beam, 38.8 feet; depth of hold, 22 feet; old measurement tonnage, 1261. A gilded eagle formed her figurehead, and her neatly-molded, elliptical stern was adorned with the coat of arms of New York. She was launched fully rigged and ready for sea somewhat ahead of schedule, which so pleased her owners that they presented the builders with a bonus of $2,500.

California business being very active, Surprise was immediately loaded for San Francisco, partly at Boston and partly at New York. She sailed from New York on December 13, 1850, and arrived at San Francisco on March 19, 1851, in 96 days, 15 hours, from Sandy Hook light to anchorage off Clark's Point. This was the record up to that date. From San Francisco to Hongkong she made a run of 46 days, and from Hongkong to London, 107 days.

In this round voyage New York to London via San Francisco and Hongkong, Surprise earned enough in freights and passenger fares to pay all expenses, pay the entire cost of the vessel and distribute a net profit of nearly $50,000. Those were the days to operate ships.

Between 1851 and 1867 Surprise made 16 round voyages similar to the above with consistently fast average performance but no more records.

In 1867 she was practically rebuilt and rerigged at New York. She continued in the Oriental trade until she was lost on the coast of Japan on February 4, 1876. During the whole of her career after 1852 she was in charge of Captain Charles A. Ranlett or of his son, Charles A., Jr.

Sweepstakes

Launched at New York from yard of Daniel and Aaron Westervelt for the firm of Chambers & Heiser on June 21, 1853. She was: 216′ 4″ overall length; 235′ keel length; 41′ 6″ beam; 22 feet depth; and 1735 tons old measurement. She spread 13,000 yards of canvas.

Sweepstakes made 3 voyages New York-San Francisco in 125 days, 117 days and 95 days, respectively, pilot to pilot, the last being the eighth fastest on record for the course.

Her fourth voyage was from New York to Bombay in 74 days, said to be the record for that run; fifth to San Francisco in 105 days.

On April 24, 1862, she arrived at Batavia in ballast from Adelaide. She had struck on a reef in Sunda Strait, and went into dock at Batavia, where a survey showed extensive damage, and she was sold for account of whom concerned.

Technical Marine Men!

Leaders in ship operating and allied interests convened from all maritime centers of America at the 47th Annual Banquet of the Society of Naval Architects and Marine Engineers at the Waldorf-Astoria in New York on November 17. Honored guest was Admiral Emory S. Land, chairman of the U. S. Maritime Commission.

PACIFIC MARINE *Reviews*

L. B. PEEPLES RETIRES AFTER 41 YEARS

L. B. (LEW) PEEPLES—vice president of Crane Co., in charge of sales and branches in the states of California, Nevada, and Arizona, retired from active service last month to devote his entire time to personal interests and travel.

Peeples is a native son of California, having been born in Gualala, Mendocino County, February 17, 1872. He joined the Crane organization in the summer of 1898 as a salesman in the Portland branch, covering the Seattle territory. Four years later when the company established a branch in Seattle, Peeples was appointed manager. In 1912 he was transferred to Los Angeles, a larger branch, as manager, and later was elected a vice-president.

All of his activities with the company have been confined to the Pacific Coast, and it may be said of his success that under his supervision Crane branches in this territory have increased in number and importance until today they are located in 17 cities in California, Arizona, Nevada, Oregon and Washington.

His ability , understanding, and genial character have made him an inspiration to all those fortunate enough to be closely associated with him. Not the least of his talents was in the development of men who worked for him, many of whom became efficient executives in Crane branches or at headquarters in Chicago. His 40th anniversary was marked by a dinner given in his behalf by the California wholesalers of plumbing and heating products at the Los Angeles Atheltic Club.

No one will deny that "Lew" Peeples has earned relief from business

L. B. Peeples

responsibilities, and his many friends wish him ever increasing happiness, health, and enthusiasm.

BRIDGEPORT BRASS CALENDAR

Among the vast number of Holiday messages received by our staff there is no more beautiful seasonal greeting than the new 1940 calendar from Bridgeport Brass Company . . . so here's thanks to **Ralph Phelps** and **Herman W. Steinkraus!** This calendar carries some reproductions of color photographs of interiors of the new Bridgeport rolling mill at Bridgeport, Conn. Some of the most attractive Balcom paintings are also used in this calendar.

CAPTAIN RIPPON PASSES

San Francisco's Marine Exchange received word of the death in Canada of **Captain Thomas Rippon**, marine superintendent for the Canadian Pacific Steamship Company's coast fleet. Captain Rippon was well known in California ports, having made many trips in connection with his company's affairs.

A. M. GARLAND RECEIVES WORD FROM OLD FRIEND

A. M. Garland, pioneer executive in transpacific steamshipping, onetime general manager of the old China Mail and also for years with the Pacific Mail Steamship Company, recently received a letter from his friend—**Captain King Zeeder,** formerly transpacific and canal route shipmaster. Captain Zeeder is safe and sound at Biarritz. He had been in Berlin. The colorful shipmaster, with a host of Pacific friends, is now a resident of Cape Town.

WILLIAM TYRRELL— 40 TRIPS AROUND WORLD!

In the American President liner President Polk, sailing from Los Angeles the other day, was **Chief Officer William Tyrrell** setting forth on his 41st voyage around the world! His mileage is well over the million mark. Incidentally, the President Polk is on her 48th globe-circling voyage.

HAROLD R. SWANTON PROMOTED

The firm of Precision Bearings, Inc., announces that **Harold R. Swanton** has been elected vice-president and will henceforth have complete charge of the activities of this organization. Swanton is widely known in Western industrial and engineering circles.

1940 NOMINATIONS FOR L. A. CHAMBER

Los Angeles Chamber of Commerce nominations for 1940 officers and directors were recently announced, revealing that **J. L. Van Norman** will head the organization as president. The formal election is scheduled for January 10, but nominations are usually tantamount to election.

Among the 42 directors nominated is **Emerson Spear,** past president of the Los Angeles Junior Chamber of Commerce and one time member of the Los Angeles Board of Harbor Commissioners. It is assumed that Spear will head the chamber's all important Harbor, Foreign Commerce and Shipping Committee of 250 members, succeeding William Groundwater. Spear, through his two companies—the Pacific Wire Rope Company and Pacific Wire Products Company, exporting to world markets and importer of raw materials, is thoroughly familiar with foreign trade and shipping affairs.

A.P.L. OPENS SEATTLE OFFICES

President Joseph R. Sheehan of the American President Lines announces the opening of Seattle offices. **Leon J. Lancaster,** one of the best known transportation men in the Northwest, and former passenger agent for the American Mail Line and Pacific Steamship Lines, was selected to head up the new A.P.L. branch office in Seattle. The offices are at 1326 Fifth avenue. With the title of district freight and passenger agent, Lancaster will serve the territory of Washington, Oregon, Idaho, Montana and British Columbia.

PACIFIC TRAVEL BOOM

Edward G. White, passenger manager for Nippon Yusen Kaisha, returning home to San Francisco after a tour of American cities, makes the prediction that the Far East and West Coast and around South America tours will set a 1940 record in travel volume. White said that wherever he went there were many inquiries regarding San Francisco's 1940 Exposition program—expressions of enthusiastic hope that the fair of 1939 would be repeated in 1940—which it will be!

Emerson Spear

BILL RUDY APPOINTED

John F. Govan, president of Xzit Sales Company, has announced the appointment of W. H. (Bill) Rudy as Pacific Coast sales manager of the national soot-eradicator organization.

This elevation to the important post is fine recognition of Bill Rudy's long and resultful work with the Govan interests on both Coasts. He joined up with Jack years ago, "when the first pound of Xzit was sold." It is interesting to note that this product was first introduced on the Pacific seaboard. With its growing acceptance by shipowners throughout the various maritime districts, the management was prompted to move the factory location back to the Eastern territory in order to supply the demand from a more strategic geographical hub. Bill Rudy, remaining in charge of the Pacific district, will have supervision of all Xzit salesmen, coordinating their work with that of the agents and distributors at Coast ports.

Rudy comes into aboard-ship work quite naturally, as his forebears were steamboat men for generations back. He was raised around Cincinnati, and came out to the Coast eighteen years ago "just to try out some of that salt-tanged air" he'd been hearing about all his life. His choice of ocean breezes over lake zephyrs prevailed, and you couldn't get him away from the Pacific without tremendous effort.

His work has always been in the specialty selling line—with products for engine room use as his first, last and constant preference.

William H. "Bill" Rudy

McCORMICK

McCormick Steamship Company, managing operators of the Pacific Argentine Brazil Line announce the appointment of Agencias Unidas as freight and passenger agents to represent them in Costa Rica, Guatemala and San Salvador. The head office of the Agencias Unidas is located in San Jose, Costa Rica, and this appointment was effective December 30, 1939.

ERNEST C. LOW HEADS ROEBLING

Ernest C. Low succeeded **Frederick W. Hammond,** retired, as president of John A. Roebling Sons Company of California. . . The announcement told of Hammond's retirement on December 31st following forty-one years with the Roebling organization. A dinner in Hammond's honor was given at the Palace Hotel in San Francisco on December 22nd. Present were the regular employees and branch managers from the Los Angeles, Portland and Seattle offices, as well as the retired employees of the firm. Low has been connected with the Roebling Company for 29 years and for the last nine years has served as sales manager and secretary. **E. A. Trask** becomes manager of the San Francisco branch. Other appointments are **E. T. Zeoli,** treasurer, and **H. D. Tuttle,** secretary.

New Heads for Mariners Club

Standing, left to right—Cyril Meek, H. H. Brann, Fred McLean, Frank Fox, Captain A. T. Hunter. Seated, left to right—Fletcher Monson, W. D. Conn, President Walter J. Walsh, R. H. Glissman and Eugene V. Winter.

IT'S FULL SPEED AHEAD

for the Mariners Club of California! Revitalized by the dynamic work and enthusiasm of "the old guard," the reorganization of the former Propeller Club of California is now complete. On January 3rd (just a day or so ago!) the election of new officers was consummated with these results:

Walter J. Walsh, long a leading figure in California naval and merchant marine coordination, is the new president.

Captain A. T. ("Tom") Hunter, member of the San Francisco Bar Pilots, and former president of the old Propeller Club, is vice-president.

Stanley E. Allen, who has an unbroken record of serving the organization since its inception some ten or more years ago will continue as Secretary.

President Walsh has developed a new organization chart which promises to enroll the assistance of a goodly percentage of the club's roster in actual committee work. New committees are set up as follows:

Membership
Reception
Public Policy
Finance
Publicity
Club Participation

The personnel of these groups:

Membership
F. F. Monson, Chairman
H. H. Brann — V. W. Hoxie
Sid Livingston — T. A. Short

Program Entertainment
R. H. Glissman, Chairman
F. H. DePue — Mac Gilmore
C. H. Robertson — L. Siverson
John Parker — Bob Christy
Jerry Lalor

Reception
Ed MacFarlan, Chairman
Harold Weule — S. E. Allen
Cyril Meek — Julian Arntz
Charles Cox

Public Policy
Frank Fox, Chairman
A. T. Hunter — C. H. Robertson
W. D. Conn — C. M. LeCount

Finance
A. T. Hunter, Chairman
E. V. Winter — Wm. Empey
Ed Martin

Publicity
Jerry Scanlon, Chairman
Paul Faulkner — J. S. Hines
Bern DeRochie — Ben Foster
Howard Oxsen

Golf Tournament
Russ Pratt, Chairman
B. L. Haviside — John Pruner
John Parker — Art Donnelly
Chas. Dilke

Harbor Day
H. T. Haviside, Chairman
Capt. Clyde Parker — Capt. J. W. Jory
Jack Bolger — C. Kriemler

Navy Day
Walter J. Walsh, Chairman
Capt. Lewis Mesherry

Club Activities
W. D. Conn, Chairman
F. H. DePue

Columbia Steel Promotions

Promotion of three executives of Columbia Steel Company, subsidiary of United States Steel Corporation, was announced on December 12 by **William A. Ross,** president.

They were **J. R. Gregory,** elected vice president and general manager of sales; **F. B. DeLong,** vice president in charge of sales, Los Angeles District; and **C. S. Conrad,** assistant general manager of sales, manufacturing and construction accounts.

Mr. Gregory, a native of Chicago, Ill., has been associated with the steel industry since 1911, when he joined the Illinois Steel Warehouse as salesman.

Mr. DeLong, born in Sparta, Wis., started work in 1909 as a topographer for the United States Geological Survey. In 1910 he joined the Portland office of the Crane Company as salesman. After serving as superintendent and manager of a number of firms important in the heavy industries, he joined the Los Angeles District sales office of Columbia Steel Company in 1938 as manager of the Tubular, Alloy and Stainless Department. A few months later he was appointed district manager of sales of Los Angeles.

Mr. Conrad succeeds Mr. Gregory as assistant general manager of sales, Manufacturing and Construction Accounts. He was born in DeKalb, Ill., and started work with the Fairbanks Morse Company at Beloit, Wis. In 1930 he became affiliated with National Tube Company, subsidiary of United States Steel Corporation, and in 1932 was transferred to the sales department of Columbia Steel Company, where he was shortly promoted to the position of San Francisco district manager of sales.

The appointment of **Harry E. Rogers** as San Francisco district sales manager of Columbia Steel Company was also announced.

Marine Exchange Rallies Members

We have received the December 30 bulletin of the Marine Exchange of The San Francisco Chamber of Commerce.

So worthwhile is its message that we are prompted to quote it here in its full length . . . knowing that many of our readers will gladly rally. Our compliments to M. A. Cremer, manager, for this spirited and timely crusade:

"This bulletin is directed to all those who hold cards of admission to the floor. To those who do not have cards but are entitled to them, may we remind you to ask for them.

"Not so many years ago, the Exchange floor was the principal meeting place of the business leaders of San Francisco. Daily, these men went out of their way to visit the floor, to meet their friends and to exchange the latest news of the day. At times it was necessary to use one's elbows to secure standing room. Few regarded themselves as either too important or too unimportant to rub shoulders here.

"During the trying times of the past decade, the Exchange floor did not entirely escape the ill effects of the depression. But it has survived!

"The number of members appearing on the floor during the past few months has *increased by at least twenty-five per cent.* To the Floor Committee and the membership in general are due congratulations for the success attending their efforts in bringing this about.

"The Exchange floor is alive! It is becoming of greater interest every week. If there were any doubt regarding the trend, it should have been dispelled by the unexpected large attendance at the festivities on the Friday preceding Christmas. Our facilities were overtaxed. Hundreds were unable to get within the entrance doors.

"Visitors from other maritime cities in the United States and abroad assure us that excepting Lloyd's of London, no other marine floor anywhere can be compared with that of San Francisco. Those of our members who have traveled extensively tell us that not in New York nor Boston, Philadelphia nor Baltimore, New Orleans or any European or other foreign port is there to be found on any marine exchange floor, such an atmosphere of friendliness and general bonhomie as prevails here among those in the maritime industry of San Francisco.

"*Your Marine Exchange spends a considerable part of its income to provide this floor for you.* If you do not use it, you are missing something!

"If you do, consciously or unconsciously, adopt resolutions for 1940, may we suggest that *you determine to become better acquainted with those who are identified with the most important industry of the Pacific Coast and of its leading port* by making it your business to drop in on the floor whenever time permits, even if only for a few minutes during the noon hour.

"MAY YOUR NEW YEAR BE A HAPPY ONE!"

Propeller Club at Tacoma

The November dinner and meeting of the Propeller Club, Port of Tacoma, was held Tuesday, the 21st, at the Elk's Club.

The meeting was called to order by our President, Hal Davis, who immediately introduced the Seattle visitors, who included Captain H. A. Jeans, a past president of the Seattle Propeller Club, B. A. Riley of the Seattle Merchants' Exchange, who is the present head of the Seattle Club, and Alex D. Stewart, their Secretary.

The first matter brought before the Club was the report of the two nominating committes. J. L. Moore was nominated for President; Robert G. Murphy and E. J. Pole for Vice-president; Charles C. Cramp for Secretary; Fred Tuttle for Treasurer; and Perry D. Moore, George Foss, C. E. How, and John S. Dyer for membership on the Board of Governors. The election was held at our regular meeting in December.

President Davis spoke to the Club regarding new members. It was decided to not keep the membership limited to strictly marine workers but to branch out for members who are employed in other lines of business.

Mr. Riley gave a short eulogy on the late Professor Gould of the University of Washington, who passed away recently. He spoke very highly of his interest in maritime affairs and of his work in the Propeller Club.

Captain Jeans gave a short talk in connection with the Propeller Clubs of California, with particular reference to the former Propeller Club of California which had just lately changed its name to the Mariner's Club of California.

As the highlight of the evening, President Davis introduced the principal speaker of the program, Captain Wallace Langely of Seattle, who gave us an interesting report of his visit to the National Convention at New York.

Immediately after Captain Langely's address, Ed Pole of the Insurance Department of R. E. Anderson & Co., Tacoma, gave a short talk and explained very fully the new insurance rates as effected by the present European War.

There being no further business on hand, the meeting was adjourned by the President.

Charles C. Cramp,
Secretary.

* * *

The December dinner and meeting of the Propeller Club, Port of Tacoma, was held Tuesday evening, December 19th, at the Union-University Club. The change of meeting place was due to alterations being made at the Elk's Club which will not permit us to continue our meetings there.

The election of officers was the first business brought before the Club by President Davis. The following were elected to serve for the 1940 season.

President, J. L. Moore.
Vice-President, R. G. Murphy.
Secretary, Charles C. Cramp.
Treasurer, Fred Tuttle.

George Foss and J. S. Dyer were named on the Board of Governors in

place of C. B. Lingerman and S. J. Maxwell, to serve for the next three years. Perry Moore was also named on the Board to fill out Vice-President Murphy's unexpired term.

Immediately after the election of officers was completed, the guest speaker, Mr. Philip M. Crawford, was introduced to the members present. Mr. Crawford, who is District Manager of the U. S. Bureau of Foreign and Domestic Commerce, with offices in Seattle, gave a very fine and instructive talk in connection with the history of this Bureau and of its service to the business man.

A general discussion was held after Mr. Crawford's address, after which the meeting was adjourned by the President.

Charles C. Cramp,
Secretary.

California Maritime Academy

The following gratefully received letter tells its own story:

Pacific Marine Review,
500 Sansome Street,
San Francisco, California.

Dear Sirs:

Captain Nichols has referred to me your letter of 5 December, suggesting that the Propeller Club, Port of California Maritime Academy, might furnish reports of the port's activities.

It would be a real pleasure for our port to join the senior ports in the pages of the Pacific Marine Review. At the present our cadets are on leave and the ship undergoing annual overhaul, hence Propeller Club activities are at a standstill. However, as soon as possible, I will see that a student correspondent is appointed, and you will receive regular reports of our meetings. If a resume of the past fall's work is of any value we could readily furnish that now.

Thank you for your interest.

Sincerely yours,
GEORGE BARKLEY,
Faculty President, Port of California Maritime Academy.

Propeller Club of the U. S. Port of San Francisco News

The Port of San Francisco

Tirey L. Ford
President

Frazer A. Bailey
First Vice-President

Charles L. Wheeler
Second Vice-President

Joseph R. Sheehan
Third Vice-President

Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

Members and guests of the Propeller Club of the United States . . . Port of San Francisco . . . convened on Tuesday, December 5th, in the Concert Room, Palace Hotel, to attend the regular monthly luncheon program.

Presiding was Tirey L. Ford, president of the organization. Present at the speakers' table were important ship-operating executives in attendance to hear the inspiring address of Lewis Byington, eminent San Francisco leader.

Guest speaker Byington, without question one of the city's most gifted orators, stirred his audience to the degree that a rising ovation acclaimed the climax of his message.

Introduction of guests included several visitors from distant lands. Mention of Buenos Aires in this connection inspired impromptu anecdotes on the part of President Ford—and the guest speaker himself.

The entire meeting, flavored with enthusiasm and good fellowship, was well attended with a high percentage of the enrollment aboard.

The January meeting is now under development and after the double week-end of holidays, plans will soon be crystallized for another get-together.

1939 Marine
ELECTRICAL DEVELOPMENTS

By H. C. COLEMAN
Manager, Marine Electrical Engineering,
Westinghouse Electric & Manufacturing Company

Marine electrical equipment to the value of approximately $12,500,000—that is the estimated aggregate cost of all the auxiliary motors, controllers, auxiliary generators, switchboards and electric couplings for the 141 vessels which had been ordered by the Maritime Commission up to November 1, 1939. This gives a definite indication of the importance of electricity on the modern cargo and combination cargo and passenger vessels.

One of the most interesting developments of the year has been the completion and installation of the first electric couplings to be placed in a vessel in the United States. This installation consists of four electric couplings, each rated 2230 H.P., 240 r.p.m., on the Maritime Commission cargo vessel Mormacpenn, being completed by the Sun Shipbuilding & Drydock Company. This vessel is propelled by four 240 r.p.m. Busch-Sulzer diesel engines driving a single propeller, turning at 85 r.p.m., through a Falk reduction gear. Each engine is connected to the reduction gear by means of one of the electric couplings. A simple control was developed to utilize the rapid maneuvering advantages obtainable with this type of coupling. Extensive tests were made on the first coupling at the plant of the engine manufacturer, these tests being conducted in conjunction with the engine using a water brake load. This installation will be watched with great interest, since it is the first one of the Maritime Commission vessels using geared diesel propulsion with electric couplings to go into service.

Electric couplings for three sister ships have been completed and shipped. Work is proceeding in the manufacture of eight 4375 H.P., 180 r.p.m. electric couplings of similar design for use on four combination cargo and passenger vessels for the Maritime Commission, each vessel being propelled by two Sun-Doxford diesel engines connected through electric couplings to a Westinghouse reduction gear.

A total of fourteen 2100 H.P. electric couplings are now being built for use on seven C-1 cargo vessels for the Maritime Commission, each vessel being driven by two diesel engines connected by means of the electric couplings to Westinghouse reduction gears.

These figures indicate the confidence of the engineers of the Maritime Commission in this modern method of coupling diesel engines to reduction gears, and testify to their progressiveness in adopting this new coupling, which has many operating advantages.

During the year, additional improvements have been made in cargo winch equipments. Control has been simplified, with further improvement on operating characteristics. Nine hundred and seventy-five equipments of this type are being built or have been completed for Maritime Commission vessels of the C-1, C-2 and C-3 types, eight vessels for the Export Steamship Company, and six vessels for the Seas Shipping Company.

Many other auxiliary equipments are under construction for the Maritime Commission vessels as well as for Naval vessels. Among these are the direct current auxiliary motors and controllers and switchboard for the three fleet tugs being built at the Staten Island plant of the Bethlehem Shipbuilding Co. In this equipment is included the apparatus for one of the largest towing winches ever built. This winch has many unique features, including new control methods for obtaining constant tension during towing.

The year 1939 marked the 20th anniversary of the installation of the first diesel electric propulsion equipment in the United States. The development of this system has progressed steadily and many new vessels have been added to the list each year, and 1939 has been no exception.

A Diesel Electric Tuna Clipper

Considerable progress has been made abroad in the last few years in the application of alternating current machinery for diesel electric propulsion. No such installations have yet been made in this country. Equipment is now being built for the first drive of this kind, although it is of a very special nature and not similar to the ones which have been made abroad. The application in question involves a 500 H.P. diesel electric plant with alternating current electric equipment for a tuna fishing vessel now being built at San Diego, California. This type of vessel has an auxiliary power load bearing a high ratio to the propulsion power requirements, due primarily to the refrigeration load. It is therefore desirable to use a system which is capable of supplying power to both the propulsion and auxiliary power busses simultaneously. Accordingly, it was decided on this vessel to install a power plant consisting of two 175-KW. and one 125-KW., 440-volt, 3-phase, 60-cycle, constant speed diesel-driven generators. These units will operate in parallel on a common power bus which will feed both auxiliaries and propulsion motors. The vessel will have a single propeller driven by a propelling unit consisting of a herringbone type reduction gear having a ratio of 5.8

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Building in American Yards

Direct Reports from Yards as of December 1, 1939

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Contract dated September 18, 1939.

One pineapple barge 175′ x 45′ x 11′; 650 gross tons; for Young Brothers, Ltd., Honolulu, T. H. Contract dated October 4, 1939. Completion date March 10, 1940.

DRYDOCK AND ROUTINE REPAIRS:

U.S.S. Honolulu, M.S. California Standard, Fr. Str. Wisconsin, U.S.A.M.P. Gen. Franklin Bell, Admiral Wiley, Fireboat Dennis T. Sullivan, Fireboat David Scannell, M.S. Tolten, Frank G. Drum, Charcas, U.S.A.T. Leonard Wood.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 35-ton crane all-welded steel whirley derrick barge; 120′ x 44′ x 9′; for U. S. Engineers, Bonneville, Ore. Keel laid June 5, 1939; launched September 16, 1939.

One twin screw tunnel all-welded stern towboat; 2500 H.P.; 93′ x 25′ x 6′. Keel laid October 2, 1939; launched November 11, 1939.

One 200,000-gal. capacity all-welded oil barge; 144′ x 35′ x 8′. Keel laid October 16, 1939; **launching date December 16, 1939.**

One 15-ton whirley derrick barge, all-welded; 93′ x 40′ x 6′. Keel laid November 25, 1939; **launching date December 30, 1939.**

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission.

FELLOWS & STEWART, INC.
Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS:

L. A. City Fireboat No. 2; Schr. Yachts Adventure and Mariner; Power Cruisers Rainbow and La Jota; 37 smaller yachts and commercial boats.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Purse Seiners St. Mary, Morning Star, Star of Monterey, Western Spirit, Santa Rita, Western Clipper, Western Monarch and Eneas; Lightship No. 83; Cutter Golden Gate; Tug Morton S. Tower; Oil S. Midway; S. S. Tahoe, W. R. Chamberlin, Jr., Davenport, Idaho, Oregon, Svea, Stanwood and Lumberman.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. **Launching date, December 10, 1939; delivery date January, 1940.**

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Sts.
Seattle, Wash.

NEW CONSTRUCTION:

One stern wheel steam snagboat, Preston, for U. S. Engineer Dept. **Delivery date January 1, 1940.**

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Launching date, October 14, 1939; estimated delivery date, March 9, 1940.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

M.S. Finnanger, M.S. Capella, Warwick, Scotia, Barge Erskine M. Phelps, Florence Luckenbach, Texan, Kansan, M.S. Tatuta Maru, Munami, Maui, Agwiworld.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Covered lighter (YF-259); keel laid November 29, 1939.

Order received for construction of two fuel oil barges (Y044 and Y045), dated July 11, 1939.

DRYDOCK AND ROUTINE REPAIRS:

Indianapolis, Cincinnati, Sampson, Bailey, Mackenzie, McFarland, Sepulga, Tippecanoe, Bridge, Robin, California State, Snapper.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; launched September 15, 1939. No. 196, keel laid September 19, 1939; **launching date December 22, 1939.**

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission.

DRYDOCK AND ROUTINE REPAIRS:

Hidalgo, Louisianan, O. A. Brodin, R. J. Hanna, Capt. A. F. Lucas, Delawarean, Californian, Wallingford; Purse Seiners Lina B. and Santa Lucia; Albatross, Mary M., Berg, Isleton, Salawati, New Ambassador, Thor I, Willmoto, Honolulan, Humaconna, James Griffith, San Joaquin, Boschfontein, Silverado, Komoku, H. T. Harper, Storm, Korshamn, Disa, Yankee Clipper, United, North Star, Haviside Barge No. 3, Torvanger, Farallon, Genevieve H2, Sunde, Chicago, Pacific Fisher, Marmex.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138); keel laid September 23, 1939; launched November 6, 1939.

Ala (YT139); keel laid September 23, 1939; launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:

Breese, Brooklyn, Idaho, Dakota, Wilson, Yorktown.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Floridan, North Sea, M.S. Marie Bakke, G.B. Petroleum II, M.S. Columbia, William Luckenbach, West Cape, Romulus, North Coast, J. A. Moffett, Border King, M.V. General, Tug Intrepid, Paul Luckenbach.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, purse seine fishing vessel; keel laid November 1, 1939.

DRYDOCK AND ROUTINE REPAIRS:

Fishing Boats Valencia, Sitka, Sonja, Kingfisher.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. **Delivery date January 1, 1940.**

Six oil barges 195′ x 35′ x 10′ for Socony-Vacuum Oil Co.

Seven cargo barges 175′ x 26′ x 11′ for stock.

Ten coal barges 175′ x 26′ x 11′ for stock.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates June and August, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1475, 1476 and 1477, three freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching date, No. 1475, September 16, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

Hulls Nos. 1481-1484, four freight vessels; 450′ BP. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938; launched September 9, 1939. No. 4331, keel laid September 18, 1939.

Hulls Nos. 4337, Delbrasil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. **Launching date, No. 4337, December 16, 1939.** Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launched August 17, 1939; **delivery date January 22, 1940.** No. 8002, keel laying date December 16, 1938; launched September 15, 1939; delivery date March 1, 1940. No. 8003, keel laying date December 23, 1938; launching date November 10, 1939; delivery date May 1, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Keel laying dates March 1, April 1, July 1, October 15 and December 15, 1940, respectively. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

CL 50, Helena, light cruiser; L.B.P. 600′ beam 61′7¾″, standard displacement 10,000; geared turbine engines; express type boilers; keel laid December 9, 1936; launched August 27, 1938; **estimated delivery date December 15, 1939.**

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date March 1, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100 x 25′ x 12′; 805 H.P. Fairbanks-Morse engine. Delivery date May 1, 1940.

One wooden deck scow 118′ x 36′ x 10′. **Delivery date December 28, 1939.**

CHARLESTON, S. C., NAVY YARD
Charleston, S. C.

NEW CONSTRUCTION:

One harbor tug, Heekon (YT141); LOA 100′, beam 25′.

One harbor tug, Nokomis (YT142); LOA 100′, beam 25′.

One harbor tug, Small (YT143).

Five destroyers, Roe (DD418), Hilary P. Jones (DD427), Grayson (DD435), Swanson (DD443) and Ingraham (DD444).

One seaplane wrecking derrick, No. 10 (YSD10).

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

Hull No. 167, sub-chaser PC-452, length 174′, for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1567, one welded flush deck cargo box barge 100′ x 26′ x 6′ 6″ for stock; 165 gross tons.

Hulls Nos. 1569-1572, four welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 1000 gross tons.

Hulls Nos. 1605-1608, four welded covered cargo barges 175′ x 26′ x 11′; 2120 gross tons.

Hulls Nos. 1623-1628, six welded steel coal barges 134′ x 34′ x 17′ for stock; 4602 gross tons.

Hulls Nos. 1636-1637, two welded steel automobile carriers 175′ x 30′ x 11′ for Commercial Barge Lines; 1092 gross tons.

Hull No. 1639, one welded steel coal barge 175′ x 26′ x 11′ for stock; 472 gross tons.

Hulls Nos. 1646-1649, four welded steel coal barges 175′ x 26′ x 11′ for stock; 1888 gross tons.

Hull No. 1650, one welded steel coal barge 170′ x 40′ x 17′ for Oliver Transportation Co., Philadelphia, Pa.; 1100 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1653-1656, four welded steel

carfloats 330′ x 40′ x 11′ for Long Island RR, Philadelphia, Pa.; 5212 gross tons.

Hulls Nos. 1657-1658, two steel barges 50′ x 20′ x 5′ for War Department, Corps of Engineers, Office of Chief of Eng., Washington, D. C.; 76 gross tons.

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hulls Nos. 1660-1673, fourteen welded steel coal barges 210′ x 26′ x 11′ for Wheeling Steel Corp., Wheeling, W. Va.; 7924 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135′ x 26′ x 8′ for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hulls Nos. 1675-1677, three welded covered cargo barges 175′ x 26′ x 11′ for Mountain City Mill Co.; 1590 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hulls Nos. 1679-1688, ten type W-7 welded coal barges 175′ x 26′ x 11′ for stock; 4720 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; **launching date December 20, 1939;** delivery date June, 1940.

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; keel laying date March 2, 1939; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; keel laying date May 15, 1939; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laying date December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 7, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 153, tanker for Standard Oil Co. of N. J.; keel laid March 13, 1939; launching date November 4, 1939; **delivered December, 1939.**

Hulls Nos. 158, Flying Fish; and 159, Comet; two C-2 cargo vessels for U. S. Maritime Commission. Keels laid May 26, 1939; **launching date December 16, 1939.**

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keels laid, No. 162, May 8, 1939. No. 163, July 24, 1939; No. 164, October 9, 1939; No. 165, November 13, 1939.

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Contract date March, 1939; completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels. Contract date September, 1939.

Hulls Nos. 269 and 270, two sand and gravel barges, 100′ x 26′ x 6′ 6″, for stock. **Completed December 10, 1939.**

Hull No. 271, ferryboat for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.; 105′ x 35′ x 5′. Completion date March 1, 1940.

Hulls Nos. 272 and 273, two flat deck barges for West Virginia Pulp & Paper Co., N. Y., N. Y.; 105′ x 32′ x 7′. Completion date March 1, 1940.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. **Delivery date January, 1940.**

One all welded diesel electric automobile and passenger ferry 185′ 2½″ LOA x 55′ beam over guards x 15′ 6″ deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. **Delivery date January 1, 1940.**

One all-welded twin screw automobile and passenger ferry; 132′ LOA, 43′ 8½″ beam and 10′ deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406′ x 57′ x 23.5′.

MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

U.S.E.D. Dredge Atlantic.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
90 Broad Street, New York

NEW CONSTRUCTION:

Hull No. 364, Russell (414), destroyer; keel laid December, 1937; launched December 8, 1938; **delivered November 3, 1939.**

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938; launching date, August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939. No. 37 launched September 29, 1939.

Hulls Nos. 373, 374, 375 and 376, fou single screw cargo vessels for United State Maritime Commission; turbine propulsion gross tonnage, Nos. 373 and 374, about 730 tons; Nos. 375 and 376, about 8000 tons length 435′, breadth 63′, depth 40′ 6″. Keel laid, No. 373, November 14, 1938; No. 374 November 28, 1938; No. 375, March 6 1939; No. 376, May 1, 1939. Launching dates, No. 373, April 28, 1939; No. 374 June 21, 1939; No. 375, October 18, 1939 **No. 373 delivered November 30, 1939; No 374 delivered December 4, 1939.**

Hull No. 378, battleship, 58, Indiana, fo U. S. Navy.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenge and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 9100 tons. Keels laid, No. 379, October 2, 1939; No. 380 November 13, 1939.

Hull No. 385, aircraft carrier No. 8 Hornet, for U. S. Navy.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938; **launched December 2, 1939.**

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

PORTSMOUTH, N. H., NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp; 1600 gross tons; 300′ x 65′ x 20′; steam UnaFlow propulsion; 3600 H.P.; 16-knots speed; cost \$1,000,000. Delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413′ x 60′ x 37′ 6″; turbine propulsion; 4000 H.P.; 14-knots speed; cost \$1,928,000. Delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95′ 6″ x 24′ x 14′ 9″; steam UnaFlow propulsion; 600 H.P.; 13-knots speed; cost \$200,000. Delivery dates July and August, 1940, respectively.

(Page 96, please)

LITERATURE OF THE INDUSTRY

Circular 58 of the Kennedy Valve Manufacturing Company announces a new line of bronze globe and angle valves with plug-type disks and renewable seat rings for close control in throttling service and for general heavy duty.

These valves are made in sizes from ¼-in. to 2-in. for 200-lb. steam at 550° F. and 400-lb. cold water, oil or gas, non-shock; and in sizes from ¼-in. to 3-in. for 300-lb. steam at 550° F. and 600-lb. cold water, oil or gas, non-shock.

The plug type disk and renewable seat ring are both of copper-nickel alloy, the seat rings being made of a harder composition than the disk. The angularity and length of the disk and seat ring have been proportioned to minimize wear at small openings and to permit tight closure.

The stems have 60,000-lb. per sq. in. tensile strength with acme standard threads, and have rounded stem head to permit self-centering of the disk. The bonnets are provided with particularly heavy union bonnet rings, and have machined seat on the under surface to permit repacking under full line pressure when the valve is wide open.

The Elastic Stop Principle, an extensively-illustrated catalog recently issued by the Elastic Stop Nut Corporation of Elizabeth, New Jersey, announces the addition to its line of nine new types of nuts, all of which embody the basic Elastic Stop self-locking element, a resilient non-metallic collar built into the head of the nut.

This collar, in resisting the entrance of the bolt or screw, forces the thread faces into a pressure-contact which is maintained after the nut is tightened. With thread play thus eliminated, the nut cannot work loose under vibration, operating stresses, or wear of surrounding parts.

The new types of nuts are designated as thin hexagonal, spline, internal wrenching, countersunk and counterbored one-lug anchor countersunk and counterbored two-lug anchor, countersunk corner anchor, bracket anchor, floating right-angle anchor, and floating basket anchor. With variations in sizes, thread systems and materials, 160 new standard items are offered.

The new *Lunkenheimer Catalog* 78 illustrates, describes and lists the complete line of bronze, iron and steel valves; boiler mountings, lubricating devices; oil and grease cups; whistles; cocks; fittings; and other products. Copies will be sent on request by The Lunkenheimer Co., Cincinnati, Ohio.

Cutting Speed Conversion Tables showing the revolutions per minute required for turning bar stock at surface speeds of 90 to 550 ft. per min. with Kennametal steel-cutting carbide tools have just been made available by McKenna Metals Company, 225 Lloyd Avenue, Latrobe, Pa.

Printed on both sides of heavy paper, these tables are useful to time study men, tool designers and machinists. They permit quick determination of the nearest spindle speed to the best cutting speed when using Kennametal for turning various diameters of work. These tables should be used in conjunction with the chart of "Materials Machined with Kennametal," which gives the recommended surface speed for machining steels and other materials with this new hard carbide material.

The formula for determining the horsepower to prevent stalling of machines is set forth at the beginning of the tables.

Copies of the new cutting speed conversion tables, as well as of the charts "Materials Machined with Kennametal," will be mailed free to interested readers upon request.

1939 Electrical Developments

(Continued from page 88)

to 1, the pinion being coupled to three wound rotor induction motors coupled together in tandem. The first motor will be rated 500 H.P. at 1175 r.p.m., the second motor 250 H.P. at 880 r.p.m., and the third motor 60 H.P. at 500 r.p.m.

Control for propulsion will consist of a simple motor-operated drum controller remotely controlled from a desk in the pilot house. This drum controller will provide the proper sequence connections to the three propelling motors, together with proper secondary control for each unit. Thus it will be possible to completely maneuver the vessel without excessive current requirements from the main generators, and it will be possible to operate at three definite speeds with no secondary loss, and the overall efficiency of propulsion is relatively high.

The development during 1939 has shown a continuance in the trend toward the use of higher speed diesel engines in connection with electric drive using combined variable voltage and engine speed control. A trend toward more serious consideration of alternating current electrical equipment for diesel electric drive for special cases has been noted. Another interesting trend is the general adoption and extended use of the electric coupling on geared diesel propulsion plants.

Building In American Yards

(Continued from page 94)

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hull No. 180, single screw diesel cargo vessel, C-2 design, for U. S. Maritime Commission; equipped with Sun-Doxford engine. **Delivery date November 24, 1939.**

Hulls Nos. 182-185, four single-screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery dates December 31, 1939; January 23,** March 10 and April 15, 1940, respectively.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; delivery dates April 15, 1940, and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

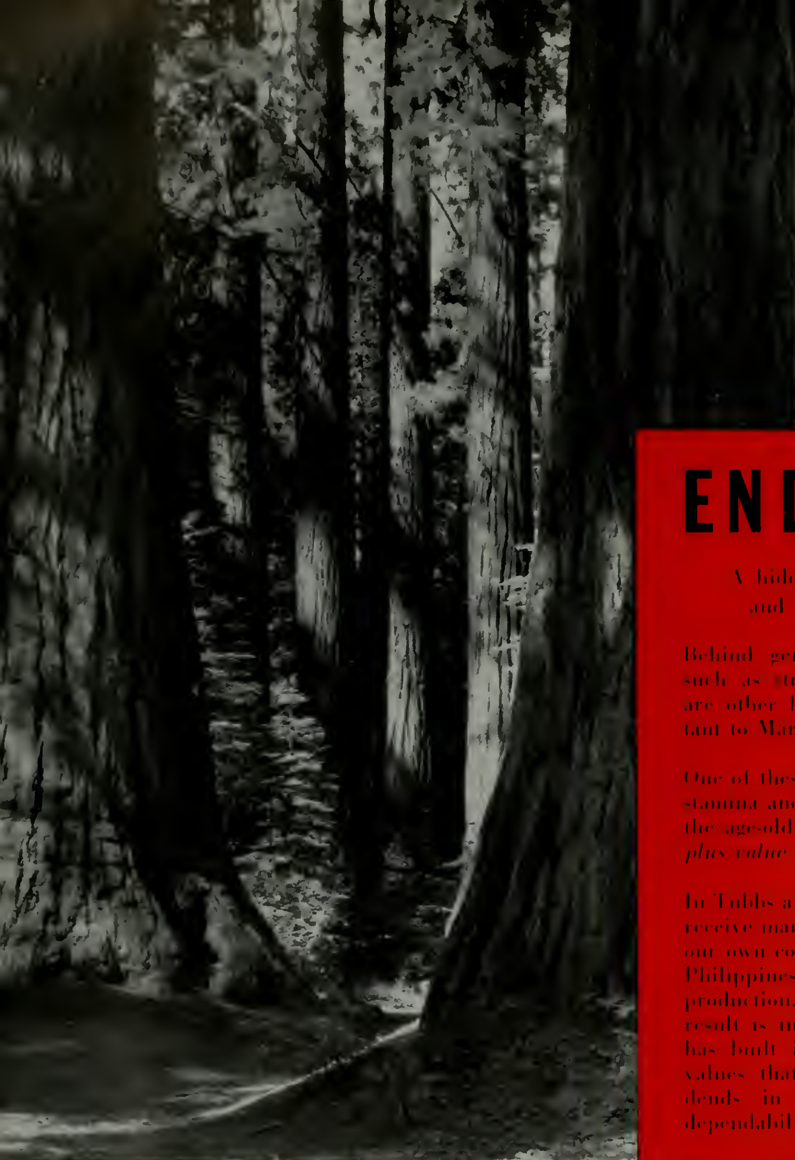
NEW CONSTRUCTION:

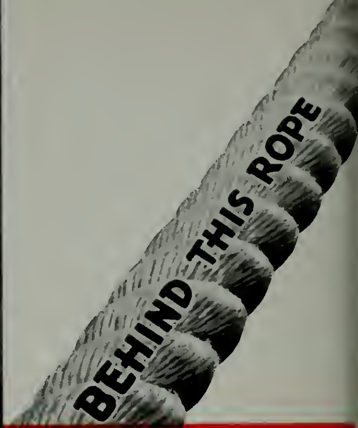
Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. **Launching dates,** No. 33, October 31, 1939; **No. 34, January 10, 1940.**

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

PACIFIC MARINE REVIEW

FEBRUARY, 1940





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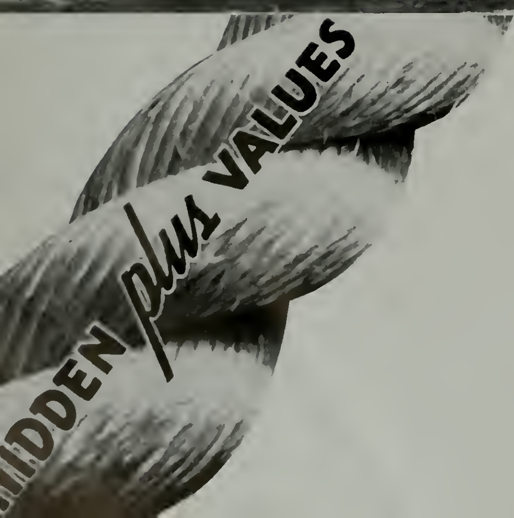

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Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

Our Cover

This month we reproduce a photograph of the spirited painting by C. R. Patterson showing the famous American Clipper Flying Cloud under full sail at sea. This vessel, built by the great Donald McKay of Boston, holds the sailing ship record from New York to San Francisco round the Horn. On her maiden voyage, under Captain Josiah Perkins Cressy, she left New York June 2, 1851, and arrived San Francisco August 31, 89 days, 21 hours from up anchor, New York harbor, to down anchor, San Francisco Bay. On her fourth voyage, in 1854, she made the same run in 89 days, 8 hours. Distance logged on the latter run, 15,091 nautical miles; average speed, 7.04 knots. It is claimed that no steamer afloat at that time could have maintained that speed on a non-stop run of such length.

Flying Cloud was the only vessel that twice made this voyage in less than 90 days. She was 235 feet long, 40.8 feet beam, and 21.6 feet depth, with a measurement tonnage of 1,782.

The Maritime Commission cargo steamer Flying Cloud was delivered by the Federal Shipbuilding and Dry Dock Co. in December. She is: 459 feet long; has a beam of 63 feet; has 13,900 tons displacement; carries 7,500 tons of cargo; and could make the same non-stop voyage as her famous ancestor in less than half the time of the sailing ship record.

Contents - February 1940

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B. N. DeRochie, Assistant Publisher
Paul Faulkner, Advertising Manager
Alexander J. Dickie, Editor
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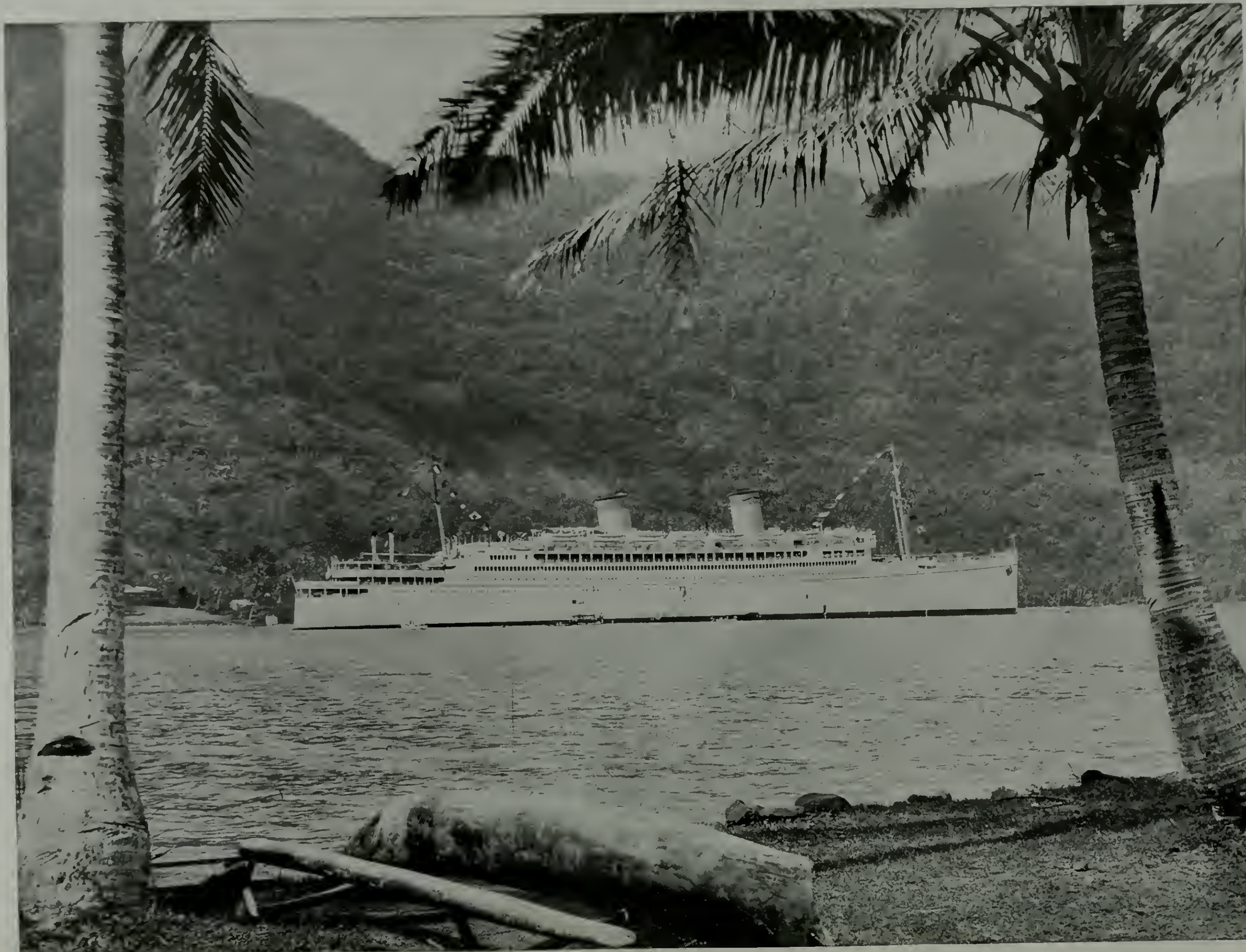

MATSON-OCEANIC LINER
S S MONTEREY AT PAGO PAGO

PACIFIC MARINE REVIEW

VOLUME 37
No. 2

FEBRUARY
1940

A Stimulating Safety Record

The 1939 report of the Secretary of Commerce contains a section devoted to the activities of the Bureau of Marine Inspection and Navigation, from which we quote the following very remarkable statement:

During the year, no passenger life was lost on any inspected vessel of the United States as a result of casualty, defective equipment, or culpable fault on the part of the licensed officers or certified personnel comprising the crews of our merchant vessels. During the past four years 1,107,507,124 *passengers have been carried on inspected merchant vessels of the United States with the loss of but one passenger attributable to the causes just referred to.*

In other words, the American merchant marine licensed and unlicensed personnel is apparently "safety-minded" to such a degree that a passenger taking a voyage anywhere on an American vessel has better than 250 million chances of arriving to one chance of not arriving.

We give the credit to the personnel for this record because of the tremendous numbers of passengers involved, which shows that all classes of vessels, seagoing, harbor and river, contributed to this record. Old, reconstructed and new vessels carried these passengers. All, of course, were periodically inspected by the personnel of the Bureau, but comparatively few were equipped with the latest safety devices and built with the modern fireproof construction.

The report shows that in 1939 the inspectors of the Bureau of Marine Inspection and Navigation traveled 329,571 miles (174,219 at sea) and inspected 134 passenger vessels (104 at sea). These men also inspected 141 tankships, 254 tank barges and 29 freighters. They made 94 special inspections and served on boards of inquiry for 147 investigations. Apparently nothing is overlooked where Safety at Sea for American passengers is concerned.

The Bureau, notwithstanding this magnificent record for passenger safety at sea, is much concerned over safe working conditions on shipboard.

Accidents and casualties to crew members continue in spite of the good work of safety engineers. The Pacific Coast, with its coordinated Accident Prevention Bureau, representing all maritime employers, has been leading the world in crew safety, but unfortunately the Pacific Coast effort covers only about 15 to 20 per cent of American seagoing personnel.

A similar coordination on the Atlantic and the Gulf Coasts would go a long way toward getting at the causes of these accidents and casualties, and toward discovering the most practical method of reducing them to a minimum.

Certainly it would be far better for the industry to achieve this result by its own effort than to have the Federal Government impose restraints and regulations that might be more costly than the evil they are designed to cure.

Some Errata

In the description of the United States Lines' liner America, building at the Newport News Shipbuilding and Dry Dock Co., October, 1939, issue, page 35, the first column, last paragraph (describing the auxiliarly power plant), should read:

"There will be four Westinghouse geared turbine drive, 600-KW, direct-current, 120-240-volt, 3-wire generator sets with compensators."

On page 42, January, 1940, issue, the caption over the central portrait of lower row (executives of Union Plant, Bethlehem) should read:

"F. McLean, general superintendent, Alameda Yard"

On page 49, January, 1940, issue, center of last column, in article on Consolidated Steel Corporation, the item chains for the C-1s building at that plant should be credited to the National Malleable Castings Co.

RECIPROCAL

Trade Agreements and Shipping

By Max O'Rell Truitt

U. S. Maritime Commissioner *

The problems confronting American shipping are many and varied. Our success in solving those problems depends upon the clarity with which we are able to view them, the energy with which we attack them, and, above all, the degree of cooperation with which those of you who represent private initiative, and we, who represent the Government, are able to achieve.

The continuation of the Hull Trade Agreements Program is of importance to all segments of the national economy. It is of special importance to those who make their living from shipping in foreign commerce.

The Program was inaugurated in 1934. It ran originally for a period of three years. It was reaffirmed by Congress in 1937. Agreements have been negotiated with 21 countries which normally account for three-fifths of our foreign trade. The enabling act is again before Congress. It is the earnest hope of those interested in the foreign trade of the United States that the Program may be extended for another three years. No industry has a greater stake in the outcome than the shipping industry.

There has been great controversy about the Program. Proponents have envisioned trade agreements as a solution for all of our difficulties. Critics have predicted nothing less than national disaster if the Program were continued. Actually, the issue is not, in my opinion, that important. Trade agreements are not a cure-all. They will not solve the many vexing problems with which we are confronted. They do, however, offer a great contribution, a step in the direction of trade and peace, and the prosperity upon which, when all is said and done, peace is likely to depend.

The thesis of this Program is as plain as ABC. It is based upon the simple fact that a lasting trade between nations, like a lasting trade between individuals and between firms, must benefit both parties. Foreign trade, in its fundamentals, is just like any other trade. Of course, specialization has been refined and the mechanics of exchange have become more complicated with time, but the underlying principle is exactly the same as that which motivates trade between individuals or between two sections of the same country.

Modern industry, which depends upon trade for its existence, has increased the standard of living manyfold. It might be argued, of course, that we would be better off if we didn't have so many material possessions. I won't attempt to debate that point. Most of us, however, like to eat good food, live in good houses, send our children to good schools, drive automobiles and enjoy generally as many of the good things of life as we can. We are able to have what we do have principally because of one factor—trade. And the term "trade" includes foreign trade.

It has been estimated that the industrial revolution increased man's productivity by four times. There is no way of computing the degree to which our well-being has been enhanced by trading with other nations. I have attempted to make a rough guess of the extent to which foreign commerce increases the national income of the United States. My guess is that this figure would be in the neighborhood of 25 per cent. In other words, those who now make $6 a day would be reduced—in their ability to buy—to perhaps $4.50 a day. This is something that those who are responsible for the welfare of the American worker should keep in mind. Moreover, the consequences of such an attempt would be the first certain step down the road which leads to autarchy, totalitarianism and the horrible struggles which inevitably follow in the wake of state-controlled economies.

Trade agreements are based upon the principle of unconditional most-favored-nation treatment. This principle involves nothing more or less than an undertaking on our part to treat all comers alike. That means that when we give concessions to one country in a trade agreement we automatically extend them to all other countries which do not discriminate against us. This might look like giving something for nothing. In reality, it is the only fair way to do any business and is the most profitable method in the end.

Critics of the Trade Agreements Program are very active at this time. Those who advocate outright abandonment are fewer now than when the Program was begun. However, there have been advanced various proposals which, while ostensibly concerned with procedure, would in fact destroy the Program.

Congressional Ratification

Congress, if it so desires, can insist that the Senate ratify each agreement. Insistence upon that right would undoubtedly kill the Program. The Executive branch of the American Government has asked Congress to approve a broad policy and then leave the mechanics of negotiation to those who are expert in such matters and who have no axe to grind except the interest of the country as a whole. This, it seems to me, is a reasonable com-

*Abstract of an address delivered at the Executive Luncheon of the American Merchant Marine Institute, New York, January 11.

promise for us to make with conditions as they are. There are some who regard this procedure as a sacrifice of democratic principle. Actually, it is one of the best safeguards which we have against that regimentation of all kinds of business, particularly of foreign trade, which we have seen come about in so many other countries. If we are to have freedom of enterprise, let's have some of it in our foreign trade.

Cost of Production Formula

Another proposal which has gained considerable support is that we endeavor to ascertain the difference between the cost of producing articles in the United States and what it costs to produce them abroad and then make the tariff in each case equal to this difference.

Those of us who are in the shipping business certainly know how difficult it is to ascertain the cost of building vessels abroad and operating them under foreign flags. We have a Research Division at the Maritime Commission employing more than a hundred people; we send men abroad to make intensive studies, yet we find it very difficult to determine the difference in the cost of constructing vessels in America and the cost of constructing them in foreign yards as well as the difference in the cost of operating them under American and foreign flags. And ship costs, I am told by those who know, are child's play compared to some that the Tariff Commission has had to work on.

Whether those who propose the cost-of-production formula know it or not, this procedure, if actually applied, would mean the end of our foreign trade.

Along with this cost-of-production discussion there has been a lot of talk about the low standards of living in foreign countries. Some of our people claim to see a great danger to the American standard of living in the fact that foreign workers are paid lower wages than our workers. I have never been able to see what that has to do with the matter. We buy a foreign-made product because it is produced more economically, because it is better, or for both reasons. The foreigner buys from us for the same reasons. Each side benefits, both the seller and the buyer. If each one didn't benefit, there wouldn't be any business. That's the thing to keep in mind. This is business under the capitalistic system, and I think we want to keep it for a while.

Ship Subidy—A Tariff

It may seem a bit inconsistent for a member of the Maritime Commission to discuss the liberalization of trade. One of our principle activities, as you know, has to do with ship subsidies. Subsidies are nothing more or less than a tariff in reverse—which makes them, I suppose, a form of trade barrier. Unfortunately, this particular form of trade barrier is believed to be necessary if we are to have a merchant marine in foreign trade.

It costs from about one-third more to over twice as much in some instances to build vessels in the United States as it does in some foreign yards, and to run them under the American flag the percentages are about the same. That means that, if we expect to have any shipping in foreign trade, we have got to be prepared to pay subsidies sufficient to cover the higher costs of the American operator. We have found a merchant marine of some proportions desirable for the proper development of our foreign commerce and vital as an auxiliary to our defense forces. Hence subsidies in overseas shipping.

The higher costs of American operation, shipping people contend, are caused by the development of America as a protectionist country. It does not seem to be illogical, therefore, for the shipping industry to ask for some form of assistance sufficient to cover the higher costs resulting from the protection of other industries. It is not feasible to levy a straight tariff on foreign-flag shipping. We achieve the same result by paying subsidies to American operators engaged in foreign trade.

Low Rate of Subsidy-Tariff

It should be pointed out while we are on this subject that the subsidies now being paid under the Merchant Marine Act of 1936 amount to approximately 13 per cent of the earnings of the lines involved. That means that they are equivalent to a tariff of 13 per cent. As tariffs go, this is a very reasonable degree of protection. Tariffs of 30, 40 and 50 per cent are very common in the American schedule and there are some that run as high as 200 and even 300 per cent.

It should also be pointed out that American operators engaged in foreign trade carry only about a third of the goods which enter and leave our shores. Here again shipping people contend that their aspirations are very modest. Some of the industries which have been most vocative in opposing the Hull Program enjoy 90, 95 and even 98 per cent of the domestic market. One industry which has been very critical has 99.5 per cent. I have yet to find any shipping men objecting because a foreign-flag operator was able to participate in our trade to the extent of one-half of 1 per cent!

There are may reasons why the shipping industry should be interested in the continuation of the Hull Trade Agreements Program. Some of them are common to all industries; others are peculiar to shipping in foreign commerce.

The most important reason, of course, is that the Program aims at, and has achieved, an increase in foreign trade. The value of our business with other nations has increased several billion dollars during the period that the Program has been in force. No one will contend that trade agreements are responsible for all of this increase; no one familiar with the situation will deny that they have helped.

The influence of the Program is shown by the fact that trade with countries with which we have agreements has increased more rapidly than has trade with those countries with which we do not have agreements. It could be said, I suppose, that this is a purely accidental circumstance. That it is not accidental, however, is indicated by the further fact that most of the countries with which we have negotiated agreements have increased their trade with us more than they have with other countries.

Canada, in the three years of our first agreement with her, increased her purchases from us 42 per cent, while her purchases from other countries increased only 22 per cent. Cuban purchases from the United States have more than doubled since the trade

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California's Great "Land-Going" Fleet

By C. M. Romanowitz and H. A. Sawin

California's "land-going" dredges present a perplexing state of affairs for the man who thinks usually in terms of ships and shipping. They dig their own land-locked ponds, doing all productive work while moored and anchored, move forward at a speed of 1/10 of a knot, often less, per month, and have a civil engineer, who need not be on board, for a navigator. These highly-efficient mining-machines are made possible, however, only when basically sound engineering, such as any naval architect uses in the design of a ship, is employed in their construction. They are floating craft. Strength, stability, trim, displacement and freeboard—all apply as importantly as for any other piece of floating equipment. There are today about fifty bucket-line dredges in California working in gold placer deposits laid down by ancient rivers or glacial action. They vary in size from 150 tons to 3,750 tons displacement. In addition there are nearly 100 small floating washing plants fed by drag-line or other excavators. Gravel deposits are worked from the surface downward. Two large bucket-line dredges owned by Yuba Consolidated Gold Fields dig gravel from 160' or more below ground level.

Gold in pioneer days brought thousands upon thousands of fortune-seekers to California. In their wake for decades, their descendants and successors have continued to seek the yellow metal, which from the dawn of civilization has been used as a medium of exchange; a yardstick of value for trade. Because of its natural beauty, gold early won a place in the minds of men, and has been used for personal adornment since times antedating written records. Gold in prehistoric times also had an everyday utility among many races of mankind, being malleable and easily formed. Buried deep in gravels deposited by ancient rivers of South America are found solid gold barbless fishhooks and sinkers used by fishermen, who probably lost them while engaged in supplying the ever-present need for food. Occasionally, these golden relics of prehistoric times are found in the sluices of gold-dredges now mining old gravel deposits of Colombia, South America. Many of the Colombian dredges are California products, built and manned by men who learned their trade in California dredging fields.

Travelers in California, especially those who get off the main highways in some parts of the great valleys of San Joaquin and Sacramento, sometimes wonder at what appear to be huge deposits of washed gravel and cobblestones. These are rock tailings left by gold-dredges, and while the esthetically-minded consider them unsightly, they are evidence that California is an important producer of the precious metal which forms the basis for world credit, without which no nation in history has been able to survive. Gold is hoarded by individuals fearing loss of their wealth

Gold dredge Yuba No. 20 at Hammonton, Calif., has 18 cubic foot buckets, and digs 124 feet below surface of water plus a 50-foot bank.

because of intruding base coins and worthless paper money. In the United States today, gold is nationalized and belongs to all the people; it is hoarded by our government for an entirely different reason—to protect our trade. United States currency is accepted at par and freely passes from hand to hand because of our inherent and perhaps unconscious knowledge that its worth is backed by tons of yellow gold held safely.

Large Gold Production

An important California industry was started about the turn of the present century by mechanically-minded mining men, who developed an idea imported from New Zealand, from which has grown the fleet of "land-going" dredges which has made such important contributions to the nation's gold supply. As a measure of that importance, we learn from government statistics that California's bucket-line dredges, from 1898 to 1938, inclusive, produced more than 10,000,000 fine ounces of gold. The gold production figures for 1938 issued by the United States Bureau of Mines show that in that year 48 bucket-line dredges in California produced 375,296 fine ounces of gold, valued at $13,135,360. The dredged ground had an average value of .112 per cubic yard. The economic and industrial importance of this dredge fleet can be judged from these figures. The production represents nearly 29 per cent of the California gold output for 1938, and while total world figures are not available, based on past experience, it represents approximately 1 per cent of the total new gold mined throughout the world in that year.

Those who thoughtlessly criticize the tailings piles are in the same category as the man "who couldn't see the forest for the trees." Nearly all mining operations destroy land surface, but the economic demands of our civilization require that the mineral and metallic needs take precedence over other uses for land. Dredging produces returns greater than the land would otherwise earn, and most dredging is done on land of no use for purposes other than seasonal grazing or profitless agriculture. The landowner's share, invested, pays greater dividends than could be earned from the land itself. Actually, the surface destroyed by dredging in California is only a small fraction of 1 per cent of the total land available for agriculture. Large payrolls for operating and maintenance are created. Dredges are enormous consumers of capital goods. Dredging costs are widely distributed in the form of wages for parts made in mills and shops far removed from dredging fields. During depression years, several large foundries and shops were kept open only because of parts required by the "land fleet" of California and other states and countries, where the California-type dredge has been adapted to the recovery of tin and platinum as well as gold. California-built dredges are found in Montana, Idaho, Oregon, Alaska, Yukon Territory, New Guinea, Malaya, Korea, U.S.S.R. and in several South and Central American countries.

Development of Design

Technically quite simple, the capacity of a dredge to earn a profit depends on the coordination of four functions, viz., excavation, classification, metal recovery and disposition of tailings. All mining dredges,

EXECUTIVES OF CALIFORNIA'S INLAND YARD

From top down, Francis C. van Deinse, president, Yuba Manufacturing Company. A native of Michigan, he came to California in 1904 to work for W. P. Hammon. He has been connected with gold dredging and/or gold dredge building ever since.

Walter B. Macaulay, chief engineer, Yuba Manufacturing Company, has had continuous charge of design and engineering for that firm since 1911. Prior to that year he had worked with the Folsom Machine Co. and the Union Iron Works after graduation from University of California in mechanical and civil engineering.

Charles M. Romanowitz, sales manager, Yuba Manufacturing Company, is a graduate of Purdue. He joined the Yuba engineering staff in 1911.

Herbert A. Sawin, sales engineer of Yuba Manufacturing Company, joined Yuba after considerable shipyard experience on the Atlantic Coast during Shipping Board days. He graduated from Engineering, Purchasing, Production and Estimating Departments before assuming his present duties.

regardless of size, do just these four jobs. Refinement and improvements to equipment have been made constantly since the first California dredges were built by pioneers in the Oroville area. Dredges have grown in size and in yardage capacity. Steel hulls have become generally used, but wood hulls are still found on dredges and have a place in the industry, especially on properties of comparatively short life and in cold climates where timbers last indefinitely. Hulls in recent years have been given much thought to provide greater safety through better bulkhead spacing. Many dredges in the past five years have been built with hulls composed of many separate box-like pontoons, which are easily transported and assembled in the field by bolting. They form water-tight compartments and are not damaged by frozen ponds. Hulls for dredges using 8 and 9 cu.ft. buckets are the largest portable hulls built to date, but there is no reason why larger dredges could not be so constructed. The pontoon-type hull for an 8 cu.ft. diesel-powered dredge was shipped from San Francisco to Alaska and landed on shore by lighters along with other dredge material. The 33 hull pontoons weighed 330 tons. The displacement of the completed dredge is about 1,200 tons. Shipment was made on August 6, 1937, from California, and the dredge was operating in Alaska twenty miles from the landing on November 10, 1937. The portable steel hull and superstructure being quickly and easily assembled in the field made this fast erection job possible and permitted the owners to operate for about six weeks before closing down for the winter. Another 6 cu.ft. dredge with steel portable hull displacing about 675 tons was erected in Montana in 41 days.

Continuous Operation

In operation, the dredge master is in charge. Three shifts per day, every day in the year, is the usual operating schedule. Many dredges average better than 22 hours per day dredging. Lost time and its cause is carefully recorded and every effort is made to avoid lost digging time except for greasing, necessary replacement of parts and periodical clean-ups. The usual crew is 3 men per shift; on large dredges sometimes 4. The winchman operates the dredge from a winchroom, which roughly corresponds to a pilot house. One man is stationed to watch the discharge of material, avoiding pile-up from accidental causes. The other member of the crew is responsible for oiling and miscellaneous work. If repairs are necessary or lines on shore are to be moved, it is customary to bring on extra men and to complete such work as quickly as possible. Clean-up of amalgam and valuable sands are made weekly, as a rule, and by a regular clean-up gang, and concentrates are taken ashore for further treatment and reduced to bullion. Companies operating several dredges have regular crews for extra work, who put in full time at different dredges as required. Most operators have shops close by where ordinary repairs can be made.

The procedure in field construction is to build the dredge either in the pond excavation and float it after it is completed or to launch the hull onto the pond. Some pontoon-type hulls are joined while floating, and the hull actually built up on the pond surface. The hulls are bifurcated by a well forward and the digging ladder which carries the bucket line is raised and lowered through this ladder well. The driving unit of the bucket-line is the upper tumbler, a large six-sided sprocket, which is mounted at the desired height above the water line and usually about amidships. Good California practice is to dig with the maximum depth reached while the ladder is at 45° with the water level.

Digging is started at the top of the bank, and as the bucket line moves upward, the dredge swings about the spud which is at the stern and dropped to the pond bottom. The spud takes the thrust of digging, distributing the load to the fore and aft truss. Spring-mounted spud keepers help in absorbing shocks and distributing the load evenly. The side swinging is accomplished by port and starboard bow lines which are carried from the under water point of the digging ladder to shore-blocks and back to the bow of the dredge on the forward deck, thence to the swing-winch, usually mounted inside the deck-house on the starboard side. As one drum takes up the line, say, on the port side, the other pays out a slack line to starboard. As the swing is completed the operation is reversed. Internal expanding clutches are customary on the drums, and external brake bands are used. Several recently-constructed dredges use d.-c. motors and inde-

Couch and Hammon, the first successful gold dredge in California, 1898. Compare with Yuba 17 on facing page.

pendent bow-line winches mounted on both sides of the dredge. Digging speed varies with the individual ideas of the owner, and is governed by conditions of the ground being dug. One large operator considers twenty-one buckets per minute about right, while in an adjoining field another operator uses speeds as high as thirty-five per minute with a variable speed unit.

Material after it is dug is elevated to the main hopper and is classified in a revolving screen which discharges oversized tailings to a rubber stacker belt. These large tailings are stacked in a pile, and form the rock tailings which can be seen in parts of California from highways. Incidentally, these rocks are sometimes used for road-building and other purposes after being crushed and graded in separate plants built for that purpose.

Gold in the Fines

Fines (usually minus ½") are discharged through the screen to gold-saving tables equipped with Hungarian riffles with mercury-trap riffles usually used in the ratio of about 4-1. Free gold readily amalgamates with quicksilver and is cleaned up weekly and retorted ashore. There is endless discussion concerning gold losses which occur with the discharge of fine tailings overboard from tail-sluices. On a well-constructed dredge, mining clean placer gold which amalgamates freely, it is possible that the losses are less than the cost of additional equipment and labor to save them. However, in recent years jigs of one type or another have been installed on several dredges and either used as a complete recovery system or in conjunction with tables and riffles either ahead or behind the jigs. Jigs are old in mining, but new developments give them a place in gold dredging. They were first used in recent years on tin-dredges in the Orient, but were long in finding favor among goldmen. Amalgamators and other mechanical devices are needed with the jigs, and extra men are required to operate this department.

The ladder-hoist winch, on a large dredge particularly, is a most important piece of machinery, and in its proper design and use depends the safety of the ladder and the dredge itself. On one large dredge in California the digging unit, exclusive of gravel, weighs about 1,500 tons (the whole dredge weighs 3,750). Automatic safety devices are used to prevent raising or lowering of the ladder beyond normal range and also to prevent lowering at a dangerous speed or out of control. The winch drums are provided with mechanical brakes and the motor has a thrustor brake. If, for any reason, the ladder gets beyond safe limits, the "Lilly" control acts as a policeman and automatically sets the brakes on the winch.

Power for dredging is usually electric, if available, and is delivered to the dredge by a submarine shore-cable floated on barges. Most dredges in California have a.-c. electrical equipment, but in recent years several have been equipped with d.-c. units and variable speeds. This involves greater expense, but provides flexibility, which some operators think desirable. Many experienced operators do not look with favor upon the additional power-converting equipment necessary, especially as a.-c. motors can be used for all drives, and mechanically synchronized where desired. In parts of the world where electric power is not available, diesel-electric and straight diesel-powered dredges are used. In former times steam was used, but there are probably not many steam-driven mining dredges in existence today.

This yarn only touches the high spots of placer dredging—an industry far removed from the ordinary course of seafaring men. Dredgemen, like sailormen, contribute to the world's betterment, but, unlike them, can walk off the gang-plank at the end of a shift and go to the movies. Even after a vacation a man comes back to work and finds that his dredge, operated continuously during his absence, is just a few feet from where he left it. California's "land-going" fleet is an important one, even though it lacks binnacles, propellers and running lights.

Gold dredge Yuba No. 17, Hammonton, Calif.; 18 cu. ft. buckets; 112 feet digging depth; displacement 3500 tons.

Our Seagoing Personnel

Some Observations Regarding the Licensed and Unlicensed Men of the American Merchant Marine

By H. L. Seward

Professor, Mechanical and Marine Engineering, Yale University

The Merchant Marine Act of 1936 instructed the Maritime Commission to develop and maintain a strong and efficient merchant marine "manned with a trained and efficient citizen personnel." The United States Maritime Service was established by the Commission on July 14, 1938, to be administered for the Commission by the United States Coast Guard (*Semper Paratus*). A very good beginning has been made by the Coast Guard at the shore stations, on the training ships and in developing a cadet system.

As this is written (midsummer, 1939) the United States Maritime Service has enrolled 1550 men, as follows:

Licensed, deck	171
Licensed, engineers	163
Unlicensed, deck	467
Unlicensed, engineers	504
Unlicensed, stewards	245
Total enrolled	1,550

Of the enrollees 293 have been disenrolled before completion of the course for the following reasons:

At own request to accept other employment	25
At own request, no reason specified	166
Upon recommendation of superintendent	102
Total disenrolled	293

However, all of the men, including those disenrolled, have received some training of varying extent while they were enrolled. On the West Coast the capacity for licensed enrollees at Government Island has been considerably expanded. At Fort Trumbull, New London, Conn., the capacity has been increased to approximately 100 licensed men present at one time and the facilities are very well adapted for the excellent training course which has been devised. The proximity of the United States Coast Guard Academy makes this fine institution available for laboratory work.

At Hoffman Island, New York, N. Y., the capacity is approximately 600, for unlicensed men only. The program there is adjusted to about 50 new men a week, a reasonable number to be handled with present facilities. The training ship American Seaman has cruised in the Gulf and along the Atlantic Coast, touching in but one port of each state, picking up new enrollees at a rate which indicates a capacity number at Hoffman Island. By the end of this year it is expected that about 3,000 unlicensed and 400 licensed men will have enrolled, making an excellent start on the training program. In addition to the training ship American Seaman, the Maritime Service uses the United States Coast Guard Cutter Northland and the two sailing ships Tusitala and Joseph Conrad.

The contents of the various training courses were shaped at first, of necessity, to fit the individual needs of each class as far as possible. A disheartening lack of knowledge in elementary subjects was noticeable in the case of many individuals who were given special attention in smaller classes. A study of the contents of the courses, as now being evolved with further experience, is very encouraging and indicates that the desirable standards will soon be attained. Trainees who have finished the three-month courses and operators both speak very favorably of the benefits that accrue to the personnel receiving the training. Individual men have had some interesting tales to tell of the knowledge they have gained in the seagoing profession, although previously endowed with the required legal certificates of proficiency in their particular branches. This refining process, in the capable hands of the Coast Guard, is bound to have a very desirable effect in giving officers and men of the merchant marine an awareness of those arts and the handicraft which a good sailor must know. As a member of the Maritime Commission has announced:

The Maritime Commission has set a goal it believes can be reached and which is essential to the welfare of the individual seaman and the merchant fleet. It is simple and may be stated thus: the seaman is entitled to good wages, good food (well cooked and well served), good, camfortable, light, sanitary quarters, proper hours of work, reasonable and safe working conditions, and such privileges as are consistent with proper performance of duty. For these things he owes something in return. This is to know his job and do it; to be loyal and render prompt obedience to the lawful orders of those under whom he serves; to recognize that the master of the vessel is in command and to act accordingly; and at all times to live up to the oath he takes when he receives his certificate or license and to the provisions of his shipping articles. If he does this, he is helping to make a taut ship. Experience shows that a taut ship is a happy ship, and a happy ship is an efficient ship. This is the kind of a ship on which a real seaman likes to serve. On the other hand, the master owes a duty to those under him, including scrupulous observance of seamen's rights, absolute justice, protection of their legitimate interests, and

*Extracts from paper presented at the annual meeting of the Society of Naval Architects and Marine Engineers, New York, November 17, 1939.

what is called "loyalty down," as loyalty should work both ways.

To the regular enrollees there is also extended the opportunity of taking correspondence courses as given by the Coast Guard Institute. Authority is being sought from Congress to open these courses to all personnel of the merchant marine qualified to take them. Only one who meets ships' personnel frequently can realize the hunger for knowledge, apparent at almost every visit, displayed by the more competent personnel aboard as they save up questions to be asked at the first opportunity. The quality and scope of subjects included in the small collection of books on the shelf in an officer's stateroom is often a surprise to the uninformed visitor.

Cadet training systems for officers in the past have had inadequate and disappointing attention except in a few rare cases. The Maritime Commission has given special attention to this and has laid the foundation for a very successful cadet training system. In April, 1939, candidates in great number from all over the country were given examinations with very high standards, which resulted in the creation of an eligible list of 166 young American citizens, many from the middle western states, all of outstanding material. When the manning scales are completed, there will be places for approximately 250 cadets and 100 cadet officers. There are now (midsummer, 1939) 175 cadets and 100 cadet officers in service. If present plans materialize, the eligible list will be exhausted in time to require another examination of candidates in the spring of 1940. In spite of these high standards and earnest efforts in behalf of the cadets, it is unfortunate that cadets at sea are not allowed to do some of the ship's work and are thus deprived of gaining the experience they are supposed to be getting. **Deck cadets, in many cases, are absolutely prohibited from doing any seaman's work whatever, including steering, and consequently must spend all of their time studying navigation and the like, or in idleness. What will be their shortcomings when three years of such service is accepted as the equivalent of that length of time as a seaman, as prerequisite for third mate's license?**

The state nautical schools play an important part in the training of young men as future officers of our merchant marine. On June 20, 1874, an act was passed by Congress authorizing the Secretary of the Navy to encourage the establishment of public nautical schools by furnishing for the use and benefit of such schools, upon request by the Governor of the State, a suitable vessel properly equipped. This was first confined to any single school that might be established at any one or all of the ports of New York, Boston, Philadelphia, Baltimore, Norfolk and San Francisco. In 1911 the act was amended to include the ports of Seattle, Detroit, Saginaw, Mich., and Corpus Christi, Tex.

Today we have four State nautical schools functioning under this act:

(1) The New York Merchant Marine Academy, established in 1875 and located at Fort Schuyler, Bronx, New York City;

(2) The Massachusetts Nautical School, established in 1893 at Boston;

(3) Pennsylvania State Nautical School, established in 1919 at Philadelphia; and

(4) The California Nautical School, established in 1929 on San Francisco Bay.

It is expected that provision soon will be made for new vessels of appropriate design for these State nautical schools.

As the Maritime Service perfects its operations, the two types of nautical schooling can be effectively supplementary, the State school ships giving the "undergraduate" and preparatory training for officers, while the Maritime Service performs that refining type of educational work for other active personnel on the ships. This may not always be the best arrangement, but for the present it seems to be most suitable. Just as our State universities have some fine traditions in our national scheme of education, so the State school ships have a place duly earned by past performance, in our national plan for higher efficiency of personnel afloat.

British Training Board

It is of great interest to note the very successful operation of a non-governmental board in London known as the "Merchant Navy Officers Training Board" which handles the arrangements for study at sea by apprentices or cadets in the British merchant marine. A recent personal report states:

The scheme is financed by a fee of 10/6 per apprentice or cadet in the service of a shipowner, a grant from the Shipping Federation amounting to about 20 per cent and a government grant amounting to about 50 per cent of the total cost of maintenance. A range of valuable prizes is presented by the Royal Society of Arts as an incentive and are given to boys in each year of seniority of sea service. Approximately 2100 apprentices and cadets are working under the scheme The purpose of the scheme is to provide for the younger generation of navigating officer some substitute for the educational advantages which young men on shore enjoy by way of technical, continuation and evening classes. The three essentials of the scheme are a standard national syllabus covering the whole period of qualifying sea service; periodical reports on apprentices' progress and an examination on board ship to test progress and accustom the lad to the technique of answering examination questions of the type he will encounter when taking his examination of competency at the end of his apprenticeship. The test papers, when completed, are forwarded via the shipowner to the Merchant Navy Officers Training Board, whose examiners mark and comment upon the work. The papers are then returned to the lad in order that he may benefit by the criticism that has been appended. The scheme is proceeding with the utmost smoothness and the very highest commendation is due to the shipowners and shipmasters and officers upon whose cooperation the success of the scheme is to a very great extent dependent. Here is an educational enterprise to which the Government is a contributor, but is not the management.

Licensing and Certifying Personnel

The maintenance of standards of proficiency for licensed and unlicensed personnel is usually the responsibility of a central government agency but in this country the law still places the responsibility for examining candidates for licenses or the issuing of certificates in the hands of the segregated local boards, forty-eight in number. There should be a central bureau to provide uniform standards for examination questions, methods of grading and a standard procedure. An advisory system in the Bureau of Marine

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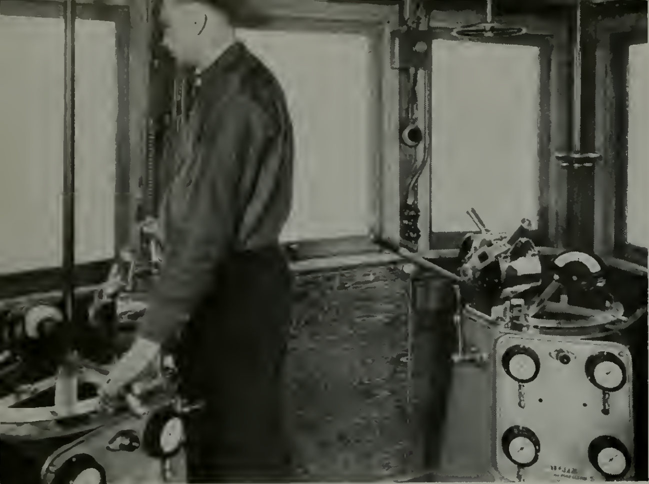


The Keith

A Swift

2,000 S. H. P.

From the plans of L. H. Coolidge, veteran Pacific Coast naval architect, comes the year's most unusual maritime development—a shallow-draft, all-steel diesel towboat expressly built for swift-water navigation on the middle Columbia River from The Dalles-Celilo Canal to Umatilla Rapids, just below the mouth of the wild Snake River.

This new tug, the Keith, built by the Commercial Iron Works of Portland, Oregon, is owned by the Columbia-Snake River Towing Company, an affiliate of the Inland Navigation Co., operators of the wheat-oil tankship Inland Chief, another "first" in Columbia River development.

The object behind the program of freight traffic on the Columbia is to extend regular, dependable navigation for barges beyond Vancouver, Wash., through Bonneville Dam and through Bonneville Pool, to the wilder portion of the river at Umatilla, some 300 miles inland from the ocean at Astoria, Oregon.

Ordinary towboats designed for the quieter and deeper river water around Portland have been tried out here, but without success. They are too slow and inefficient for swift river water, which often reaches 9 knots velocity.

The first upper-river tugboat ever developed expressly for propeller-drive, and the first ever built of steel, was done by architect Coolidge for operation on the Snake River some 25 years ago, between Lewiston and the Grand Canyon's lower end.

The Keith, as developed by Mr. Coolidge, embodies a very wide hull, of shallow draft, and subdivision of the hull carried out to the extreme. Twin propellers operate in very deep tunnels, and the design of the vessel makes it most efficient when doing about 12 knots, loaded or empty. The crest of the main wave rises under the hull just forward of the propellers at 11-12 knots, making the loss in power remarkably slight.

The old-time "outdoor truss" that used to hold the ends of the shallow wooden river steamers together from stem to stern, via tall, heavy masts and tie rods, reappears in the Keith as a unique "backbone"—a 24-inch-wide hollow welded steel girder running above the centerline of the bottom, inside the hull, to the level of the main deck. Besides stiffening the hull rigidly fore and aft, this "backbone" carries all the fuel, water and lube oil, and divides the engine room longitudinally into two separate watertight compartments, one starboard and one on the port side. Transverse bulkheads make each of these engine compartments a watertight structure of ample buoyancy to float the engine and other machinery installed therein.

The Keith is expressly designed to operate in swift water—treacherous river operations unsuited for conventional propeller-operated craft—and also will be distinguished by the fact that the vessel is propelled by twin six-cylinder, exhaust gas supercharged, high output Enterprise diesels.

She has the following principal dimensions:

Length, 92 feet, 6 inches.

Beam, 25 feet, 6 inches.

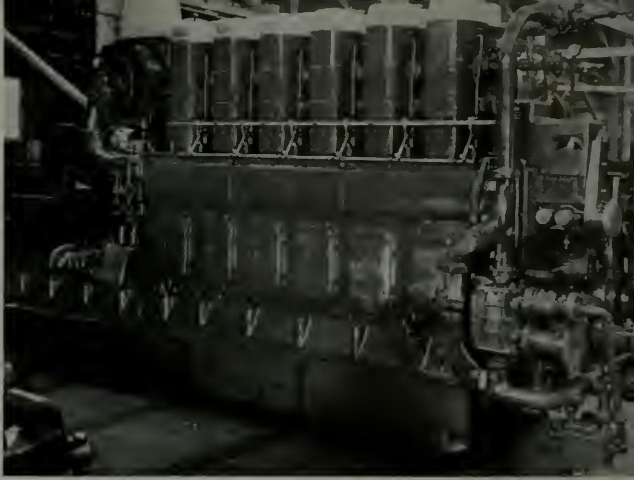
Depth, 6 feet, 6 inches.

Draft at 129 tons displacement, 42 inches.

Keith pushing a barge on the Columbia River.

Water Towboat on 42 Inches Draft

By Chas. F. A. Mann



Six-cylinder Enterprise diesel engine of type installed in towboat Keith, with Buchi exhaust gas turbine-driven supercharging blower mounted at after end.

She has a welded steel bottom and bilge structure and welded steel shell. The thicknesses of her plating are: bottom and bilge, 3/8 inch; topside 5/16 inch; deck, 1/4 inch. The longitudinal girder-tank structure is entirely of welded 1/2 inch steel. The centerline girder extends through 5/6 of entire hull and carries 800 gallons of water, 150 gallons of lubricating oil and 5,000 gallons of fuel oil.

Her layout below is largely engine and propeller room, with the hull divided into 5 watertight compartments, with two compartments amidships for the engines as described above. The main deck carries crew space for 12, 2 to a stateroom, followed by the large upper engine room with gage panels, valve gear, etc., accessible from this space. A roomy galley with General Electric (20 cu. ft.) refrigerator, a Deluxe oil burning range and twin-sink work space, in addition to the mess table. Forward on the main deck is a pair of special Beebe (Seattle) Hoists, for lashing the tow to the forward push-structure. This consists of a square-end bow arrangement with two pusher knees extending from the waterline, to match similar knees on the barge. Tightlashing the barges makes the tow and tug virtually a single operating unit. The texas houses roomy captain's quarters, large lavatory and shower, and a special guests room. The pilot house has an identical pair of twin-control Enterprise operating levers for full and instantaneous control of both engines. A lever controls the steering (pneumatic), placed beneath each of the twin control stands. A third lever for steering is placed in center, near the forward window for operating in bad weather, making three steering levers in the pilot house. The controls, together with a Weston r.p.m. indicator, are placed on both sides of the pilot house for quick handling on a bad river stretch.

Atop the pilot house are a third full set of controls and the searchlights—three in number, including a 19-inch Carlisle Finch unit. This multiple direct pilot house control of engines and rudders makes the Keith one of the most flexible tugs ever built. No engine room telegraph set-up would function for this type of service, simply because it isn't fast enough.

Machinery

Another first for the M.S. Keith is her propulsion machinery and drive, which consists of twin six-cylinder, 12" bore, 15" stroke, four-cycle Enterprise diesels, equipped with Buchi exhaust gas driven superchargers, each engine developing a continuous rating of 1000 H.P. at 650 r.p.m. Each engine is flexibly mounted, yet directly connected to its propeller shaft. Each engine is mounted on ten Korfund spring loaded Vibro-Dampers, which are in turn mounted on a light engine seating in the hull. The Kingsbury thrust bearings are separately mounted at the inboard end of each tailshaft, and the thrust shafts are

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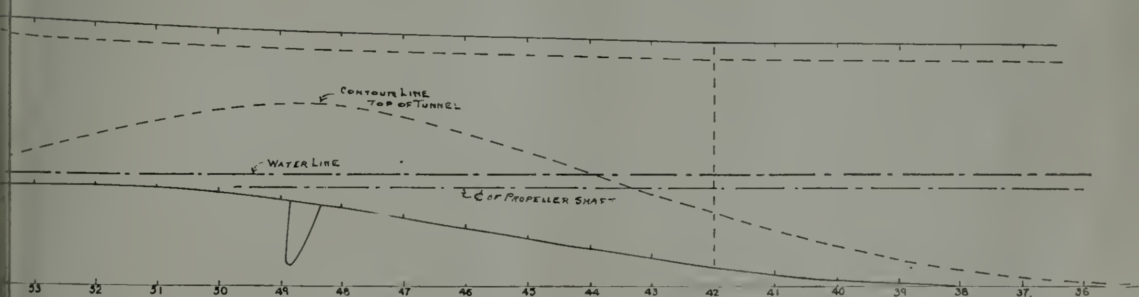


Outboard profile of after portion of hull of towboat Keith, showing contour of tunnels. Note that tunnels occupy over one-third length of hull.

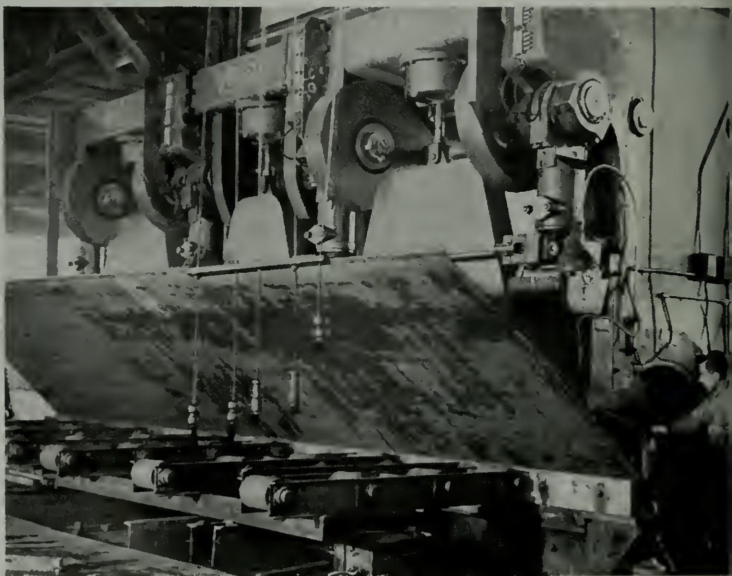
Barge

DRAVO SHIPYARDS

Top, Wilmington, Delaware, yard, where hulls for Atlantic Coast are assembled after prefabrication at Neville Island.

Center, a typical example of the unusual shaping facilities maintained at Neville Island, this press brake can flange in one operation a ¾-inch steel plate 29 feet long.

Bottom, air view of the Dravo Corporation shipyard and shops at Neville Island, Pittsburgh. (1) Structural Shop where steel for barges or other floating equipment is fabricated into large sub-assemblies; (2) Machine Shop; (3) Barge Assembly Shop, where craft for inland waters are assembled; (4) river barge ready for side launching; (5) outfitting dock, where engines and superstructure are added to craft that require them; (6) marine railways, where barges, towboats and other river craft are hauled for inspection and repair.



by the Mile

Some Notes and Pictures Showing Methods Used by America's Largest Barge-Building Plant

The recent interest in steel barges, evidence by workboat operators in all our major harbors, prompts this sketchy story on the barge-building methods and facilities of the Dravo Corporation of Pittsburgh, Pa. This organization has been building barges, towboats, dredges and similar floating units for twenty-four years. From its launching ways have slid some 1,650 hulls during that period. In point of tonnage launched in 1936 it ranked first among all shipbuilders in America, even including the builders of the largest seagoing ships.

The 1,650 hulls launched by Dravo, if placed end to end, would stretch over 50 miles, and would support well over a million tons of freight.

Originally Dravo built for the river trade, launching completed hulls at Neville Island in the Ohio River, near Pittsburgh, and delivering them afloat anywhere in the Mississippi River system. Then the demand for steel floating equipment in East Coast harbors prompted the opening of an assembly yard and launching ways at Wilmington, Delaware. This naturally led to a new technique in barge manufacture —the shop fabrication of large units to be shipped by rail for final assembly. The company is at the present engaged in filling two orders to be delivered by cargo vessel and assembled in Pacific Coast yards.

In the development of this new technique, Dravo engineers evolved some new ideas and have been responsible for many innovations in the de-

The illustration above features two of Dravo's special fabrication methods: first, the positioning jig for assembling large units for welding; and second, the serrated angle framing, which permits a continuous weld around that portion of the web which contacts the plate and facilitates unloading in liquid cargo tanks.

Below is shown a 16-piece tow being propelled down the Ohio River by a twin-screw diesel towboat. These barges and towboat belong to the Union Barge Line, an associate of the Dravo Corporation. Dravo operates 232 steel hulls, and much of the design and construction of Dravo-built equipment derives from this operating experience.

Left, a 25-ton floating crane built for U. S. Navy; fabricated at Neville Island; assembled at Wilmington. A similar crane is being shipped to San Francisco for assembly at Mare Island Navy Yard.

Below, an example of Dravo's better-shaped barge ends.

At bottom, left, welders working on an assembly in a positioning jig; right, the two ends for a large all-welded steel barge, fabricated and ready to ship to point of assembly.

tails of construction and the overall design of barge and towboat hulls. This firm was among the first to recognize the value of welding assemblies in the construction of multiple identical units for barge hulls. They worked out in this connection a system of frames with serrated edges contacting the shell plating. This system has great value in that it allows complete welding all around those parts of the frame that contact the shell plating, and it greatly facilitates cleaning of compartments and unloading of liquid cargoes.

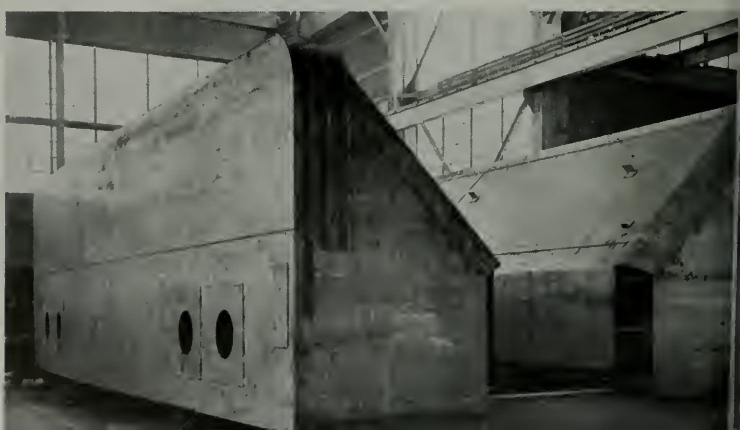
Dravo built their first all-welded steel barge in 1929, and since that time have steadily increased the use of welding in hull construction, until today practically all of their barges are welded.

The Dravo Corporation, through its associate, the Union Barge Line, operates a large fleet of barges and towboats on the Ohio-Mississippi River system. This fleet comprises some 236 steel hulls, including towboats, barges, dredges, dump scows and derrick boats. Much of the present design and building practique is derived from the experience gained in this operation of a large fleet of river boats.

Especially noticeable is this operating experience in the evolution that led to the present design of the ends of Dravo barges. The conclusions reached by practical experience were tested in towing tank model experiments and actual full-power, full-size tests on the river. The result is an end shape that greatly reduces water resistance and lowers towing power requirements.

Both of the Dravo shipyards are served by modern shops, including: structural steel fabrication shop, equipped with special equipment of exceptional capacity; machine shop equipped with tools capable of handling all the necessary operations connected with the largest towboat, tug and floating crane machinery.

Standard designs are available in the engineering department for barges of all commercial types, carfloats, lighters, dump scows, floating cranes, towboats or tugs. An efficient technical staff is maintained for working out special equipment to meet special problems.



AMERICAN

Shipbuilding and the Census

Figures Show New Jersey, New York and California Leading States in 1937

From the days when the shipyards of New England were busy turning out vessels for the whaling trade, to the present era of producing submarines, battleships and luxury liners, the U. S. Census Bureau has been recording the progress of the shipbuilding industry.

In 1940 it is making a new series of entries in a giant book of accounts which it started keeping in 1810, when the first Census of American Manufactures was taken. That pioneer effort to determine the state of our infant industries went into little detail—the tonnage and value of all ships built were listed, without regard to kind. And, indeed, little detail about kind was needed; at that time a ship meant only one thing—a wooden vessel with sails. Massachusetts, according to the 1810 Census, had an output of 23,410 tons, valued at $656,095, a big sum then, but less than half the value of the state's production of distilled spirits. The prosperous city of Philadelphia alone, however, did a shipbuilding business of nearly a million dollars in that year.

After 130 years, of course, the story is altogether different. In 1937, last year covered by the Manufactures Census, the industry's production, far more varied in character, was reported at more than $250,000,000. The figure of the Census now under way will be of added interest insofar as it reflects improvements in business brought about by international conditions.

Today the Census Bureau must include in the questionnaire for the shipbuilding industry 51 topics for reporting products made and work done. Among these are classifications never dreamed of in 1810—submarines, outboard motorboats, steel vessels and the like.

Sailboats still show up in the reports, however. There were 2,623 sailboats under 5 gross tons made in 1937, with a value of $786,238; 5 sail ships of 5 tons or more without auxiliary motive power, valued at $51,279; 27 sailships of 16 tons and over, with auxiliary motive power, having a value of $634,402; and 50 ships of 5 to 15 tons having sail and auxiliary motive power, worth $426,094.

In contrast, there were 36 steel steamships launched, and value of work done on this category of vessel amounted to $37,610,218. Steel motorships launched in 1937 numbered 106, value of work done being $12,802,321.

Figures on submarines are combined with those for steel sailing vessels and canal boats to avoid disclosing figures of an individual establishment. Total number of vessels of all three types launched in 1937 was 13, and value of work done, $4,604,549.

Other categories reported include 353 barges, of 5 gross tons and over, value $6,563,306; 10,584 motorboats under 5 gross tons, value $7,057,723; 9,645 rowboats, 5,127 canoes and 669 lifeboats.

Repair work of shipyards brought in large sums. Receipts from repairs of steel vessels totaled $77,490,761, and on wooden vessels, $18,296,667.

In addition to production, the Census of Manufactures reports on costs of materials, which in 1937 totaled more than 100 million dollars, or more than 40 per cent of value of production. This sum was 66 per cent above the 1935 figure, and wages went up 69.2 per cent, while value of products rose only 61.7 per cent. The industry employed 62,274 wage earners in 1937, with a pay roll of $93,746,576. Another $19,230,076 went to 7,613 salaried employees.

There were 544 shipyards (including boatyards) in 1937, of which 100 were in New York State, 59 in California and 43 in New Jersey. New Jersey, however, showed highest value of products, $41,621,915, New York being second with $33,936,728, and California third with $20,389,294.

Also of interest to shipping men will be the current Census of Business, in which activities of import and export agents will be covered. They will report, among other things, their net sales, stocks on hand at end of year, and amount of taxes collected from customers over and above selling price, and paid directly to any governmental taxing agency.

The basic facts obtained in the Census will be published by late summer or early fall, with special reports to follow as rapidly as possible, depending on the promptness with which all returns are received.

Reporting to the Census Bureau is required by law, but the same statute protects those giving the answers against disclosure of individual returns, or their use for taxation, investigation or regulation.

Large Steel

Ship Castings

Photographs here illustrate the four sections of the cast steel stern frame shown assembled on the facing page.

Fig. 1, left, shows the upper section, weighing 12,038 lbs.

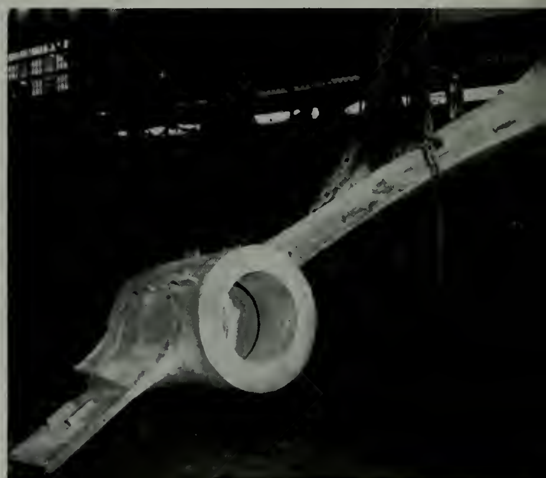


Fig. 2, at right, illustrates the middle section. containing the boss for the outboard end of stern tube and propeller shaft bearing. This section weighs 31,312 lbs.

Fig. 3, left, illustrates the lower section (or skeg) of the four-section stern frame. The section weighs 22,330 lbs.

Fig. 4. right, the rudder post shaped to form of contra propeller, supporting the gudgeons for the rudder pintles, and weighing 14.250 lbs.

From Pacific Coast Foundry

For Pacific Coast Ships

Large steel castings are used for certain members of the hulls of steel vessels. These castings are somewhat intricate in their design and form, and have always been considered difficult from the standpoint of the designer and the steel foundryman. Pacific Coast shipbuilders are therefore fortunate in having available fine facilities for producing steel castings backed by great skill and large experience in steel casting art.

This fact is very well evidenced in the building of the Maritime Commission's C-3 design large steel cargo vessels, four of which are now building at the yard of the Moore Dry Dock Company, Oakland, Calif.

The illustrations accompanying this article show the four cast steel sections which form the stern frame for one of these vessels. These sections were cast at the steel foundry of the Columbia Steel Company at Pittsburg, California.

Figure 1 depicts the upper section, which weighs 12,038 pounds. This section is incorporated into and stiffens the overhang of the steel structure above the rudder and contains the orifice for the rudder stock.

Figure 2 shows the middle section, weighing 31,212 lbs. and containing the boss, which is bored to receive the outer end of the propeller shaft tube, which forms the outboard bearing. This section must hold the shaft in proper alignment while that shaft is delivering 8,500 H.P. at 90 r.p.m.

Figure 3, the lower section, or skeg, weighs 22,330 pounds. It ties the whole assembly into the keel structure and supports the lower bearing for the rudder.

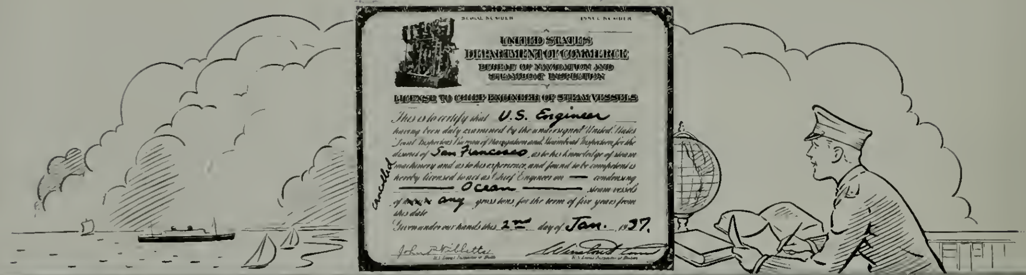
Figure 4, the rudder post, weighs 14,250 lbs. It supports the central and upper bearings for the rudder, and ties the skeg to the upper section of the stern frame. Note that this rudder post is shaped to form a contra propeller, after the approved modern type, thereby increasing the propulsive efficiency.

Fig. 5, the cast steel stern frame for Sea Star assembled on the floor of the machine shop, Moore Dry Dock Co., with dimensions shown; total weight, 43 tons.

The four castings were delivered to and machined in the shops of the Moore Dry Dock Company, and then assembled to form a complete stern frame unit, as shown in Fig. 5. This unit is then riveted into the steel frame of the hull to form an integral part of the structure of the vessel.

This stern frame, assembled, weighs 43 tons, and is the largest ever produced on the Pacific Coast for a merchant vessel, although Columbia Steel Company have cast heavier individual steel castings in one piece.

Patterns for this work were all made by the pattern shop at the Moore yard, with the exception of the pattern for the rudder post, which, on account of the contra propeller feature, was made by the Columbia Steel Company.



Your Problems Answered by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

NEW EXAMINATION QUESTIONS

Special Letter From "The Chief"

Fellow engineers—Letters are pouring in requesting information on books and the new examinations. It shows a healthy mental attitude toward our profession.

The Bureau of Marine Inspection and Navigation have issued in the November "Ship's Bulletin" a complete set of specimen questions for all grades in steam. The complete set is too long to reprint here, and in order to get them to our readers at once, we are briefing selected questions into types so that you may know the kind of information needed.

G. Gordon McLintock, principal examiner at the Bureau in Washington, D. C., has completed a remarkable job in assembling several hundred questions in engineering alone, besides many more in navigation—questions which are fair, typical and complete.

I declare again, as I have often stated in this section, that an engineer who has served more than the required time regular watches at sea, and who has the slightest curiosity about the principles and machinery around him, need have no fear of these examinations. On the other hand, one who is not naturally interested in his job and does no reading on his profession will soon find that he does not belong in the engine room.

I shall be glad to discuss and answer specific questions in this section on request.

"The Chief"

PART I
ENGINES AND AUXILIARIES
Third Assistant

Calculate, knowing necessary data:

Pitch of propeller.
Number studs for cylinder cover.
Indicated H. P. of engine.
Rate of delivery of water of wet air pump.
Average speed of ship, and propeller slip.

Explain or describe:

Characteristics of heat transfer and of various chemicals.
Combustion, vapor, condensate, saturated and superheated steam, latent heat.
Which type of turbine drive is most economical?
The dummy.
Types of turbines. Permissible speeds.
Reciprocating engine lap and lead.
Dry and wet vacuum systems.
Electric hydraulic steering engines.
Boiler feed systems in regard to pumps.
Sketch single-cylinder steam engine.

Second Assistant

Calculate, knowing necessary data:

Temperature of mixture of two quantities of water.
Time to pump out double-bottom tank.
Pressure of slide valve on seat.

Explain, describe, discuss or define:

Combustion of coal and of fuel oil.
Temperature of fuel oil to burner.
Salinometer and thermometer indications.
Fuel oil piping system.
British Thermal Units.
Radial clearance in turbines.
Turbine rotor speed and steam speed.
Use of reduction gears.
Causes of condenser tube failures.
Saponification or emulsification of lube oil.
Decomposition of lube oil.
Sketch pump end of simplex vertical.

First Assistant

Calculate, knowing necessary data:

Pressure of shoe on cross head guide.
Safe working pressure in cylinder.

Explain, describe, discuss:

Forced draft systems.
Temporary and permanent hardness in water.
Securing liners in steam cylinders.
Carbon packing in turbine shafts.
Pounds fuel per horsepower hour.
Engine crank bearing repairs.
Miscellaneous steam engine repairs.
Kingsbury thrust bearing.
Analyze indicator diagram; show defects.
Sketch bearing cap, tail shaft.

Chief

Calculate, knowing necessary data:
How long to discharge ballast.
Velocity water through a pipe.
Safe working pressure of boiler.
Best speed when fuel limited.
Diameter, water cylinder, of pump.
Explain, describe, discuss:
Efficiency of combustion by engine operation.
Superheated steam in marine engines.
Pop vs. spring-loaded safety valve.
Latent heat, vaporization and fusion.
End thrust on Parson's turbine.
Starting turbine from cold.
Setting a piston valve.
Operation without H. P. cylinder.
Maximum density of boiler water.
Operation without H. P. turbine.
Repairs to cracked steam line.
Clearances of turbine rotors.
What is water rate?
Minimum diameter of piston rods.
Sketch:
Indicator cards, showing various conditions.

PART II BOILERS

Third Assistant

Calculate, knowing necessary data:
Allowable pitch of stays.
Thickness of welded steel pipe.
Describe:
Scotch boiler. Name all parts.
Procedure, steaming up from cold.
Effect of coating of soot.
Effect of moisture with soot and ashes.
Corrosion.

Second Assistant

Calculate, knowing necessary data:
Diameter of stay bolt.
Allowable working pressure on shell.
Area tubes per sq. ft. grate.
Collapsing pressure on furnace tube.
Water tube marine boilers.
Name mountings and state purpose.
Feed water from condenser.
Function and principle, safety valve.
Common causes, structural failures.
Sketch:
Scotch boiler and mountings.
Mechanical oil burner and parts.

First Assistant

Calculate, knowing necessary data:
Safe pressure, welded steel pipe.
Heating surface.
Discuss:
Effect of poor circulation.
Effect of sulphur in fuel.
Flame impingement.
Effect of oil in feed.
Use of boiler compound.
Miscellaneous structural repairs.

Chief

Explain, discuss, describe:
Efficiency of joints, safe pressures.
Treatment boiler water.
Advantage superheated steam.
Stress of several boiler parts.
Boiler horsepower.
Energy in water and steam.
Physical properties of boiler materials.
What is "pH value"?
Chemical reactions and temperature effects.
Caustic concentration, and danger of.
Flue gas analysis. Percent CO_2.

PART III ELECTRICITY

These questions are all very much the same as have been used in past examinations.

First assistant must know something of a. c. electricity; how it differs; what Eddy currents are; how to tell when the turbo-electric drive system is out of stem.

The chief must find frequency, knowing number of poles and speed of alternator; describe power factor, excitation current; what type a. c. motor is best aboard ship; meaning of synchronized; otherwise be prepared on electricity as before.

PART IV REFRIGERATION

Third Assistant

Explain, describe, discuss why, etc.:

DEPARTMENT OF COMMERCE
BUREAU OF
MARINE INSPECTION AND NAVIGATION
WASHINGTON

January 9, 1940

IN REPLY REFER TO
200.1-1

Mr. J. S. Hines, President and Publisher
PACIFIC MARINE REVIEW
500 Sansome Street
San Francisco, California

My dear Mr. Hines:

I note with interest the reprint in part in the December number of the Pacific Marine Review of a Bureau Bulletin article on examinations for licensed officers.

Your cooperation in encouraging ships officers to study in a practical manner the many problems with which they are confronted in the conduct of their profession is appreciated by this Bureau.

As your columnist, "The Skipper", points out, the syllabus recently published in the Bureau's Monthly Bulletin as a basis for the proposed new Examinations presents certain problems in a more practical form, but does not present any new or drastically different subjects. The subjects have been divided up into chapter and verse in the setting out of the syllabus, in order to make it easy for the candidate to equip himself quickly and easily. In consequence, at first glance, it may appear that the examinations have been padded out, but the reverse is the case, as your "Skipper" points out after a preliminary study.

When they are adopted, officers will be able to complete their examinations in a much shorter period of time and without repetition.

Columns such as those of "The Skipper" and "The Chief", where problems are worked and helpful hints are given, should prove of great value to all who are sitting for examination and to all who are interested in their profession.

Yours very truly,

R S Field

R. S. Field,
Director

Ammonia compressor and fittings.
Shutting down an ammonia system.
An ammonia condenser.
Back pressure maintained on compressor.
Selection and use of lubricants.
Frosting of refrigerating room coils.
Removing compressor heads, CO_2 machine.
Charging CO_2 machine and heating bottles.

Second Assistant

Describe, explain or discuss:
Principles of refrigerator compressor systems.
Ammonia anhydride and carbon dioxide systems.
Effect of air in refrigerant.
Difference between heat and cold.
Effect of frost on efficiency.
Chemical symbols for refrigerants.
Control of capacity of system.
Water or steam in ammonia systems.
Troubles of a refrigeration plant.

First Assistant

Explain, discuss or describe:
Starting, ammonia, carbon dioxide plant.
Leaks in each of above plants.
Tonnage system of plant rating.
Equalization of H. P. and L. P. gages.
Removing ammonia compressor head.
Introduction of make-up refrigerant.

Chief

Many of the questions in the above lower grades, plus the following:
Describe the brine system.
Advantages, ammonia and CO_2 systems.
Normal pressures in expansion system.
Removing ammonia system to bottles.
Suction pressure in relation to power.
Metals qualified for these systems.
Power per ton of refrigeration.
Characteristics of "Freon-12" refrigerant.

PART V GENERAL

Third Assistant

Calculate:
Weight of boiler plate.
H. P. equivalent of 1,000 KW.
Describe, discuss:
Duties while overhauling or lay-over.
Test all-service gas mask canister.
Flare-back of furnace.
Centrifugal oil purifier.
Carbonization of lube oil.
Information, nameplate of marine boilers.
Three approved fire extinguisher media.
Temporary repair to cracked pump barrel.
Temporary repair for failure portion turbine blading.
Set slide valves, duplex pump.
Reports on accidents, casualties, repairs.
Oil tank vent pipe size.
Gage and relief valve on fire pumps.
Approval of fire-fighting apparatus.
Entering tank closed for some time.
Entering tank deficient in oxygen.
Bridge to engine signal code.

Second Assistant

Describe, discuss:
Duties on board steam vessel.
Overhauling or blowdown; necessary routine inspections.
Preparation of boilers for inspection.
Conservation of water and fuel.
Foam-type extinguisher, and how used.
Oil fires in fire room bilges.
Plugging leaking boiler tube.
Removing and replacing boiler tubes.
How ascertain safe working pressure.
Pipe diameter for steam smothering.
What other method may be used in lieu of smothering?
Locate and mark smothering manifold.
Extinguishers for various type fires.
Valves, chests and strainers in drydock.

First Assistant

Many of the questions for lower grades, plus:

(Page 58, please)

Engineers' Licenses for December

Name and Grade	Class	Condition
SAN PEDRO		
David T. Ahern, Chief Eng.	OSS, any GT	RG
Raymond H. Pierrepont, 1st Asst. Eng.	OSS, any GT	RG
Harry Rowan, 1st Asst. Eng.	OSS, any GT	RG
Otto K. E. Goemann, 2nd Asst. Eng.	OSS, any GT	RG
Hans A. W. Hansen, 3d Asst. Eng.	OSS, any GT	O
SEATTLE		
Joseph McNulty, 2nd Asst. Eng.	OSS, any GT	RG
Benjamin Drysdale, 3d Asst. Eng.	OSS, any GT	O
PORTLAND		
Alexander Luft, 3d Asst. Eng.	OSS, any GT	O
SAN FRANCISCO		
Lloyd Coughlin, Chief Eng.	OSS, any GT	RG
Lupe Castro, Chief Eng.	OSS, any GT	RG
Ole Rismyhr, Chief Eng.	OSS, any GT	RG
Leo J. Lyskowski, Chief Eng.	OSS, any GT	RG
Orlan R. Watkins, Chief Eng.	OSS, any GT	RG
William A. Theurkauf, Chief Eng.	OSS, any GT	RG
Charles E. Young, Chief Eng.	OSS, any GT	RG
Jack F. Curran, 1st Asst. Eng.	OSS, any GT	RG
Anthony M. Saiz, 1st Asst. Eng.	OSS, any GT	RG
John G. Ellis, 1st Asst. Eng.	OSS, any GT	RG
Arnold E. Ames, 1st Asst. Eng.	OSS, any GT	RG
Hughie Boyd, 1st Asst. Eng.	OSS, any GT	RG
Herman F. Zuppe, 2nd Asst. Eng.	OSS, any GT	RG
Frank A. Mitcheli, 2nd Asst. Eng.	OSS, any GT	RG
William M. Simons, 2nd Asst. Eng.	OSS, any GT	O
Clarence E. Kinsey, 2nd Asst. Eng.	OSS, any GT	O
Clarence A. Nunes, 2nd Asst. Eng.	OSS, any GT	O
Rudolf Herden, 2nd Asst. Eng.	OSS, any GT	O
William D. Soule, Jr., 3d Asst. Eng.	OSS, any GT	O
Lawrence W. Dickeson, 3d Asst. Eng.	OSS, any GT	O
Richard P. Kendall, 3d Asst. Eng.	OSS, any GT	O
Stanley A. Marshall, 3d Asst. Eng.	OSS, any GT	O
Chester B. Nash, 3d Asst. Eng.	OSS, any GT	O
Edward D. Albertson, 3d Asst. Eng.	OSS, any GT	O
Olav T. Torjussen, 3d Asst. Eng.	OSS, any GT	O
Robert S. Medwick, Chief Eng.	OMS, any GT	O
Clarence E. Kinsey, 2nd Asst. Eng.	OMS, any GT	O
Angus M. Walker, 3d Asst. Eng.	OMS, any GT	O

Abbreviations: GT is gross tonnage; OSS is ocean steamer; OMS is ocean motorship; O is original license RG is raise of grade.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

More Problems From New Tests

I notice that in the latest *Bulletin* of the Bureau of Marine Inspection and Navigation it is expected of the chief mate, in his examination questions, that he should be acquainted with time to raise steam on and the mountings of a Scotch boiler. "The Skipper" must confess that the latter is something he himself could not be relied upon to do just as well as he can "box the compass." Perhaps he may be excused if he passes comment on that subject to "The Chief." Is it true, "Chief," that the longevity, or as sea lawyers might say, and/or reliability of that particular type of boiler will retain it in service?

My personal impression was that the diesel and high-pressure water tube boiler would soon render it so obsolete that such a knowledge would scarce be worthy of acquiring. (1).

Change of Draft Problem

Here is an interesting problem taken from the "Specimen Examination" for Master, Ocean, as published in the *Bulletin* of the Bureau:

The specific gravity of the water on the coast is 1025 *oz., and at your dock, is* 1010 *oz. You are allowed* 5 *inches reduction for fresh water; how much would you load below your marks at the dock?* (2).

Answer

1025 ounces is the weight of 1 cubic foot of sea water.

1000 ounces is the weight of 1 cubic foot of fresh water.

25 ounces is the difference in weight between sea water and fresh water.

1025 ounces is the weight of 1 cubic foot of sea water.

1010 ounces is the weight of 1 cubic foot of water at the dock.

15 ounces is the difference in weight between sea water and water at the dock.

Therefore we have the proportion $X:5$

$15:25$ or $25X = 5 \times 15$

$X = \frac{5 \times 15}{25}$ or $X = 3$.

I would therefore load my ship 3 inches below her marks.

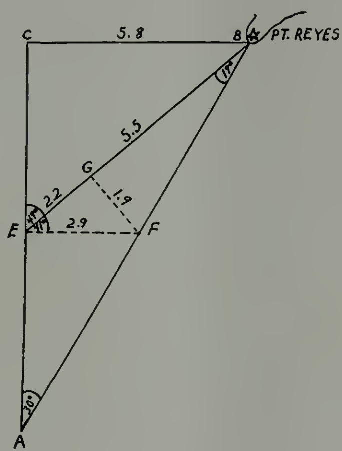


Fig. 1

Bearing Problem

Use Traverse Table No. 2 Bowditch.

Point Reyes light was bearing 30°, and after a run of 5 miles it bears 49°. Find the distance off at time of second bearing and distance off when abeam.

Answer

Suppose Fig. 1 to be a diagram of the bearings.

Construct the lines EF and FG, making all the triangles right triangles.

Then with the 1st 30° as a course and a latitude of 5, the departure (EF) = 2.9.

With the complement of the 2nd (90° — 49°) = 41° as a course and a distance of 2.9, latitude (EG) = 2.2, departure (FG) = 1.9.

With the angle between bearings (49° — 30°) = 19° as a course and a departure of 1.9, latitude (BG) = 5.5.

Therefore 2.2 + 5.5 = 7.7 miles off at second bearing.

With the 2nd 49° as a course and

(1) "The Skipper" is in error here, and the Bureau is quite right. While it is true that the great majority of new steamers in the American Merchant Marine are being equipped with high- or medium-pressure water tube boilers, it is also true that on a large majority of the steam vessels now in use in the merchant marine fleets of the world, steam is raised by return flue fire tube boiler of the Scotch marine type. The number of marine power plans still burning coal is greater than those using oil, although the aggregate tonnage of the oil-burning ships is greater. The numbers and tonnage of steamers using reciprocating engines are far in excess of those using turbines. (Ed.)

(2) The term "specific gravity" as used here is quoted directly from the questions as published in the "Bulletin" of the Bureau of Marine Inspection and Navigation. It is erroneously used here by the Bureau probably as a test to check the observation and the knowledge of definitions possessed by the examinee. The term should be "specific density" or "weight." If specific gravity were correct, the following figures would be: "on the Coast is" 1.025, and, "and at your dock is" 1.010, and no weight units would be used. Moral is: Watch the wording of problems and consider each term keenly. (Ed.)

a distance of 7.7, departure = distance off abeam 5.8 miles.

Simple Method of Constructing a Plotting Sheet

When no plotting sheets are available, or it is desired to keep a permanent and separate record of lines of position in a work book, any ruled paper may be used, the results of which will be as accurate as those obtained from a regular plotting sheet.

The D. R. position is plotted as on a Mercator chart, using the lines on the paper as meridians of longitude, and a base parallel of latitude drawn in such a position that ample allowance is made for the run to noon. A scale for the measurement of distance or difference of latitude is obtained by drawing a line at an angle to the base parallel equal to the latitude in magnitude and noting the distance apart along this line that the meridians intersect it. Where the meridians are minutes of longitude apart measured along a parallel of latitude, these intersections will be miles or minutes of latitude apart, measured along this line. Figure 2 shows an example of such records.

TRADE LITERATURE

Antimonial Admiralty, a well-illustrated, eight-page booklet in black and yellow, published by the Chase Brass & Copper Co., and describing the advantages of their new alloy for condenser and heat exchanger tubing.

The presence of antimony in the admiralty mixture produces an alloy that gives high resistance to:

(1) Corrosive water conditions;
(2) Sulphur corrosion;
(3) Dezincification; and
(4) Intercrystalline corrosion.

This superior Admiralty metal was developed and patented by the Chase Brass & Copper Co.

"King-Clip" Gate Valves, Circular No. 504-RL. of the Lunkenheimer Company. This new 8-page circular in two colors shows the complete line of Lunkenheimer "King-clip" valves with drain channels and bronze thread bushing in bonnet.

Valves are available in iron body with bronze trim for steam, oil, gas, air, water and gasoline service, and with various alloy trims for corrosive services.

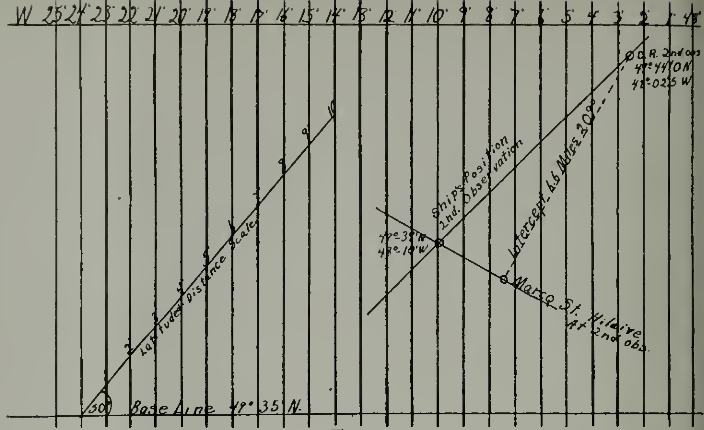


Fig. 2

Deck Officers' Licenses for December

SAN PEDRO

Name and Grade	Class	Condition
John M. Fitzsimmons, Master and Pilot	OSS, any GT	RG
Herbert M. Wiemers, Master and Pilot	OSS, any GT	RG
Mervyn W. Verran, Master	OSS, any GT	RG
Frank Curtis, Chief Mate and Pilot	OSS, any GT	RG
William P. Buchtele, Chief Mate	OSS, 12500 GT	RG
Sigurd A. Ougland, Chief Mate	OSS, any GT	RG
Jens J. Kristiansen, 2nd Mate	OSS, any GT	O
Raymond A. Barton, 3d Mate	OSS, any GT	O
Willoughby N. Bundy, 3d Mate	OSS, any GT	O
Leonard F. Gearin, 3d Mate	OSS, any GT	O

SEATTLE

Name and Grade	Class	Condition
Clifford C. Bertiaux, Master	OSS, any GT	RG
Charles N. Goodwin, Master	OSS, any GT	RG
James H. Hiss, Master	OSS, any GT	RG
Rolf L. Zingler, Master and Chief Mate	OSS, any GT	RG
Alexander Kusebauch, Master and Pilot	OSS, any GT	RG
George J. Gjertsen, Master	CWSS, any GT	O
Andrew Johnsen, Chief Mate	OSS, any GT	RG
William C. Gortz, Chief Mate	OSS, any GT	RG
Stanley E. Ridley, Chief Mate	OSS, any GT	RG
Abel G. Holmquist, 2nd Mate	OSS, any GT	RG
Bernt Abrams, 2nd Mate	OSS, any GT	RG
Arnold H. Beeken, 2nd Mate	OSS, any GT	RG
Ray Pitts, 3d Mate	OSS, any GT	O
John A. Perry, 3d Mate	OSS, any GT	O
Robert W. Kern, 3d Mate	OSS, any GT	O

SAN FRANCISCO

Name and Grade	Class	Condition
Samuel C. Frey, Master	OSS & OMS, any GT	RG
John Kucin, Master	OSS & OMS, any GT	RG
Heinrich F. T. Schneider, Master	OSS & OMS, any GT	RG
Milton M. Whitelaw, Master	OSS & OMS, any GT	RG
Edward Martinez, Master	OSS & OMS, any GT	RG
Russell P. Oates, Master	OSS & OMS, any GT	RG
William B. Slater, Chief Mate	OSS, any GT	RG
David S. Goddard, Chief Mate	OSS, any GT	RG
Frank W. Schultz, Chief Mate	OSS, any GT	RG
Harvey Stump, 2nd Mate	OSS, any GT	O
Robert R. Masters, 2nd Mate	OSS, any GT	RG
Chester H. Tubbs, 2nd Mate	OSS, any GT	RG
George D. Washburn, 2nd Mate	OSS, any GT	RG
John H. Buckley, 3d Mate	OSS, any GT	O
Harold John Boehm, 3d Mate	OSS, any GT	O

Abbreviations: GT is gross tonnage; OSS is ocean steamer; OMS is ocean motorship; CWSS is coastwise steamer; CWMS is coastwise motorship; O is original license; RG is raise of grade.

Brine Strengthening Tank

For Baby Tuna Clippers

By David W. Dickie, N. A. and M. E.

The key to efficient freezing on the tuna clippers lies in the brine strengthening tank. The necessary sea water at 28 degrees to prime the fish well must be cooled quickly and be ready to toss the fish into immediately after they are caught.

If the vessel is fitted with a Pak-Ice Machine, part of the cooled sea water must be circulated through the machine to make ice for the fish well, and the remainder must be circulated by another system to melt the ice and remove the heat from the fish.

If the vessel is fitted with high velocity coils, either in each well or in a separate chamber, in place of the Pak-Ice Machine, the sea water must be circulated over the coils to remove the heat coming from the fish.

Time is the essential factor in fish preservation, as quick cooling of the fish starts the formation of the skin glaze which prevents to a certain extent salt penetration and leaching of the flavor values of the flesh of the fish. If the interior of the fish is at 80 degrees and the circulating sea water is at 28 degrees, the heat flowing through the skin of the fish from the flesh to the water will reduce the skin temperature to slightly below 28 degrees. The classical illustration of the phenomena is the tea kettle on the gas flame. The flame is at 2,000 degrees, the water in the kettle is at 212 degrees, and the metal of the bottom of the kettle is at 75 to 80 degrees so long as the heat is being transmitted through it from the flame to the water.

When the fish have been cooled to the point where the sea water comes from the bottom of the well at 30 degrees, it is pumped overboard and 22 per cent brine cooled to between zero and 10 degrees in the brine tank is pumped into the fish well.

In the case of the Pak-Ice boat, part of the 22 per cent brine from the fish well is circulated through the machine to make ice and part is circulated with the other system to melt the ice, and in the case of the high velocity coil boat all of the 22 per cent brine is circulated over the coils.

On the voyage home, the wells in the hold of the boat are kept at low temperature by circulation through the Pak-Ice machine and the brine tank is used to cool the brine being circulated through the bait boxes on deck.

Brine Tank Coils

To conserve space and at the same time get efficient heat removal requires that during evaporation of the refrigerant the fastest possible egress of the gas from the liquid be provided and the brine be circulated at the highest practical velocity.

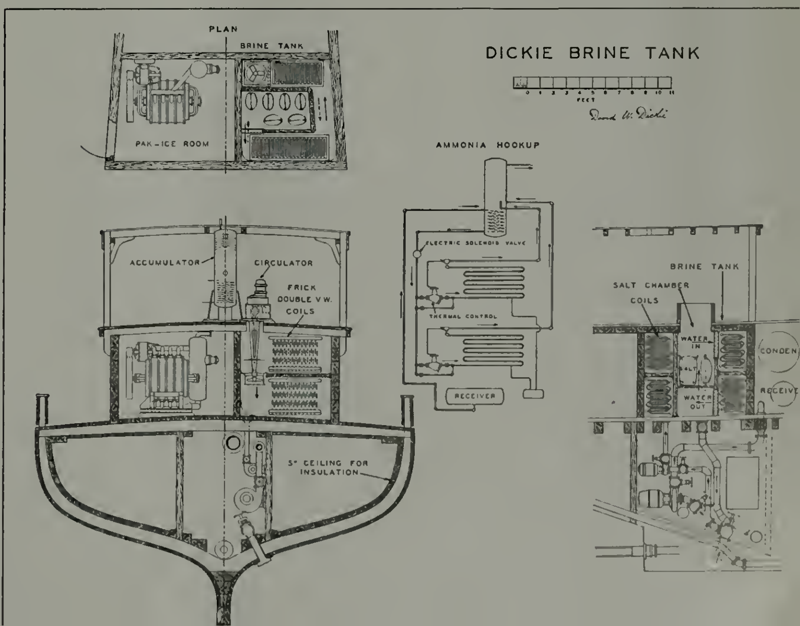
The coil illustrated is a special double Frick VW coil having eight rows instead of six, which gives a large surface area in a small space, long lengths of pipe between welds, free movement of the pipes with extreme temperatures used on the tuna boats and comparative freedom for a large volume of water to pass between the meshes of the coil.

Circulator

In calculating the capacity of the circulator it was found that much more was accomplished with less effort if the circulator was made larger in diameter and turned slower than usually recommended for ice tank service. Within the desirable limits of the efficiency curves, a 16″ diameter circulator running slow will deliver more water than a 12″ circulator running fast with the same horsepower motor.

The illustration shows the standard Pacific Gear and Tool, General Electric, two-horsepower, 115-volt D. C., 120-degree, continuous-operation marine motor fitted with reduction gears.

The circulators for the ice tanks are of the low-head type, but the head should be higher for the brine tank



than for the ice tank service. Three-inch to 4" head is customary for ice tanks but 6" to 12" should be used in the brine tank. Increasing the head materially changes the design of the propeller that should be used, and also changes the gear ratio of the motor reduction gears.

The circulation within the brine tank is the same for sea water as for 22 per cent brine, except no salt is added in the first instance. In each case the brine enters from the salt chamber at the top, passes around through the two top coils, down through the circulator, around through the two bottom coils and out into the salt chamber again. In the second case the salt sacks are dropped onto the grating in the salt chamber and when the salt has leached out of any bag the sack comes to the surface and is fished out with a boat hook. The chamber holds from six to ten 125-pound sacks of salt 27" high, 16" wide and 10" thick, and it takes about 30 sacks to make 22 per cent brine from the 17,000 pounds of sea water in the brine tank.

Cleanliness is extremely important, and so the wood walls of the salt chamber are made removable by taking out a key board, whereupon all the others come out in order. The channels at the top and bottom are either 3" or 4", depending on how the boards are clamped at the center of the height, and the walls are simply slipped in loose in the channels. The portable deck between the coils is supported by a channel at the sides of the tank and a top and bottom angle where it comes against the walls of the salt chamber.

Coil Capacity

At the lower ranges of temperatures the capacity of the coil "K" factor for the transfer of heat in B.T.U. per square foot per hour per degree temperature difference between brine and refrigerant is given as follows. At the beginning, when the brine temperature is 86 degrees, the "K" factor will be higher, of course.

Velocity of brine feet per minute	K	Velocity of brine feet per minute	K
0	10	50	35
10	16	60	38
20	22	70	42
30	26	80	45
40	31	90	48

The coil is designed to cool 17,000 pounds of sea water from 86 degrees to 28 degrees in 2½ hours and the same amount of 22 per cent brine from 86 degrees to zero in 4½ hours.

On account of the square corners of the brine tank it is not practical to use a velocity of brine past the coil much greater than 90 feet per minute, to which has to be added the velocity necessary to overcome the head. The portable fairway shields are fitted to offer some relief from the water eddies at the corners.

Heat Load

In the August and November articles in *Pacific Marine Review* the heat load was given. The August article contemplated stowing one well at a time, but the fishermen insist that when the the fish are biting it is imperative that they be caught, as sometimes it is a long search to find another school of fish. The expressed desire of the fishermen is to catch all the fish they can hold in the bins on deck, and be able the following day to catch another batch of fish before the school departs for another vicinity. However, when more than 32 tons of fish are caught on this size boat they will be lost overboard when the boat rolls, so the November article was framed to stow 32 tons, or enough fish to stow two wells.

Load A. 6,584,080 B.T.U. at 40 pounds pressure. Ammonia temperature 25.8° Fahrenheit.

Load B. 7,828,000 B.T.U. at 17½ pounds pressure. Ammonia temperature 2.35° Fahrenheit.

Load C. 3,510,000 B.T.U. at 7½ pounds pressure. Ammonia temperature −12.6° Fahrenheit.

The cooling is done in two cycles; loads A and C on cycle No. 1 for 12 hours and load B on cycle No. 2 for 12 hours alternating on cycles Nos. 1 and 2.

Assume the compressors for load B:

7,828,000 B.T.U./286,600 = 27.3 tons of refrigeration, or 54.6 tons in 12 hours, which will take three compressors 7" x 7" double cylinder turning 327 r.p.m. working at 17½ pounds suction pressure and 185 pounds condenser.

Similarly for load A:

6,584,080 B.T.U./286,600 = 23 tons of refrigeration, or 46 tons if done in 12 hours. One 7" x 7" compressor turning 327 r.p.m. at 40 pounds suction pressure gives 38.1 tons, so one compressor would run for 12 hours, leaving the remainder to the other compressor for 3½ hours.

Similarly for load C:

3,510,000 B.T.U./286,600 = 12.25 tons of refrigeration, or 24.5 tons if done in 12 hours. One 7" x 7" compressor at 7½ pounds suction pressure turning 327 r.p.m. gives 14.5 tons refrigeration, leaving the remainder to be done by the compressor released from load A in 8½ hours.

On the Pak-Ice boats it is customary to build up a supply of slush ice consisting of 12 tons of brine and 8 tons (16,000 pounds) of ice in a storage well, and while the ice supply lasts it can be used for cooling the fish wells. If it were possible to discontinue fishing at will and then find another school of fish that could be caught when the refrigeration equipment was ready, at least one of the ammonia compressors could be omitted.

By melting the stored ice and operating the Pak-Ice machine simultaneously, the following heat extraction is available in the two wells where the 32 tons of fish are stowed. (Refer to the four-section machine in the table.)

15,000 pounds of ice at 144 B.T.U. per pound removes 2,160,000 B.T.U.

Pak-Ice machine produces 1854 pounds per hour x 24 hours = 44,496 pounds of ice at 144 B.T.U. per pound, which removes 6,407,424 B.T.U.

820,000 pounds of brine raised 6 degrees removes 3,939,840 B.T.U.

Which results in a total available heat removal of 12,507,264 B.T.U.

Two wells (Table I of the November article) require the extraction of 11,949,920 B.T.U., leaving a little margin for unaccounted leaks.

The value of an efficient brine tank is strikingly evident when it is remembered that the sea water and the 22 per cent brine go to the Pak-Ice machine at low temperatures with the sensible heat removed, leaving only the latent heat of fusion of the ice to be extracted. The heat transfer surface of the Pak-Ice machine is very small when compared with the surface of a well-designed, high velocity coil.

The water supply to the Pak-Ice machine is influenced to some extent by its temperature entering the machine. It is possible to pump an oversupply of water and operate the ma-

chine less efficiently. The table gives the calculated water supply in gallons per minute, and there may be a variation in actual practice.

Condensers

Of the several ways to proportion the condensers to carry the load and at the same time combat the sea growth problem, the easiest seems to make the after condenser about large enough to carry the whole load and the forward condenser large enough to carry the load coming home when the sea condensing water is colder. This gives the men on the boat a chance to open and clean one condenser if necessary, and in case of a leak they can come home with what fish they have caught. If we adopt this method, the condensers would be as follows:

After condenser 15 feet long, 28″ diameter, 148 tubes 2″ x No. 10, 1152 square feet, 950 gallons per minute, 20 feet head.

Forward condenser 9 feet long, 20″ diameter, 30 tubes 2″ x No. 10, 140 square feet, 90 gallons per minute, 11 feet head.

NORMAL CAPACITY OF THE PAK-ICE MACHINE IN TONS OF ICE PER 24 HOURS										
NUMBER OF SECTIONS	AMMONIA SUCTION PRESSURE POUNDS PER SQUARE INCH AND TEMPERATURE OF AMMONIA IN DEGREES FAHRENHEIT									
	5 / -17 2	$7\frac{1}{2}$ / -12 6	10 / -8 4	$12\frac{1}{2}$ / -4 5	15 / -1 0	$17\frac{1}{2}$ / 2 4	20 / 5 5	$22\frac{1}{2}$ / 8.5	25 / 11.5	$27\frac{1}{2}$ / 14
2	$17\frac{1}{2}$	16	$14\frac{3}{4}$	$13\frac{1}{2}$	$12\frac{3}{4}$	11	10	9	8	7
3	$26\frac{1}{4}$	$24\frac{1}{4}$	22	$20\frac{1}{4}$	$18\frac{1}{2}$	$16\frac{3}{4}$	15	$15\frac{1}{4}$	$11\frac{3}{4}$	$10\frac{1}{2}$
4	35	$32\frac{1}{4}$	$29\frac{1}{2}$	27	$24\frac{1}{2}$	$22\frac{1}{4}$	20	$17\frac{3}{4}$	$15\frac{3}{4}$	14
5	$43\frac{3}{4}$	$40\frac{1}{2}$	37	$33\frac{3}{4}$	$30\frac{1}{2}$	$27\frac{3}{4}$	25	$22\frac{1}{4}$	$19\frac{3}{4}$	$17\frac{1}{2}$
6	$52\frac{1}{2}$	$46\frac{1}{2}$	$44\frac{1}{4}$	$40\frac{1}{2}$	$36\frac{3}{4}$	$33\frac{1}{2}$	30	$26\frac{1}{2}$	$23\frac{1}{2}$	21

WATER SUPPLY TO THE PAK-ICE MACHINE IN GALLONS PER MINUTE					
NUMBER OF SECTIONS	TEMPERATURE OF THE WATER ENTERING MACHINE				
	0°	10°	20°	28°	NORMAL
2	53	46	40	35	30
3	$79\frac{1}{2}$	69	60	$52\frac{1}{2}$	45
4	106	92	80	70	80
5	$132\frac{1}{2}$	115	100	$87\frac{1}{2}$	75
6	159	138	120	105	60

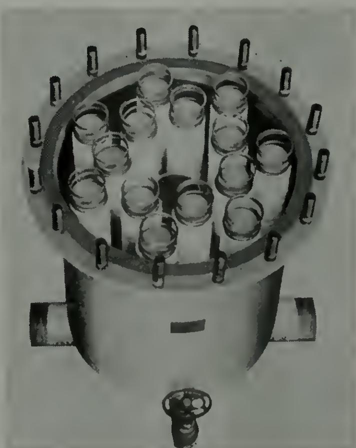
There is considerable merit in the idea of using three condensers totaling about 1,248 square feet if space is available for their installation. If one goes out they can reduce the load on the plant by halting operations between catches until the heat is removed and still come home with a full load.

As is customary on shipboard, the tubes are charcoal iron and they are fitted with Corton tube sheets.

High-Duty Fuel Filter

An average filtering cost of $.008 per 1,000 gallons is claimed for a new 28-tube Fulflo Filter, handling gasoline, Nos. 1, 2, and 3 furnace fuel and diesel fuel oil. Announced by the Commercial Filters Corporation, Boston, Mass., and designed for such applications as bulk plants, tank trucks, tank cars and ships' power plants, it removes water, dirt, tank scale and gummy residues.

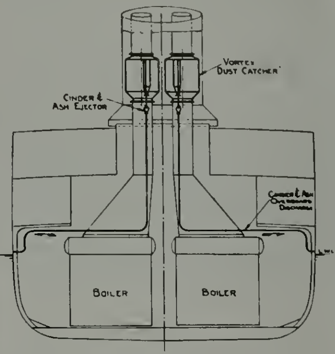
The filter has a capacity up to 225 gallons per minute and average life (based on No. 3 fuel oil at 35 lbs. pressure) of 1,120,000 gallons before replacement of tubes becomes necessary. (Rate of flow and tube life depend on viscosity and type and amount of impurity in suspension.) It is of steel construction; diameter 23″; height $32\frac{1}{2}$″; 3″ I. P. S. connections. Tube dimensions are $2\frac{1}{2}$″ x 8″. This filter is designed for operating pressures up to 100 lbs. per square inch. A drain valve is provided for the water sump.



Renewal of the honeycomb filter tubes is quick and convenient. The filter cover is removed, the old tubes lifted out and new ones inserted.

Larger or smaller models of this filter can be furnished, according to capacity requirements.

No More Dust, Soot



Typical installation, Vortex dust catcher.

A preview of what transatlantic passengers may expect in the way of maximum deck enjoyment when the new United States Line's America goes into service is furnished on the new Cunarder, Mauretania.

Vortex Dust Catchers were selected for both of these vessels to extract from flue gases all soot and stack solids which would otherwise fall on deck to cause passenger irritation.

Inspection of the new Mauretania reveals a complete absence of passenger complaints concerning this customary nuisance. Deck officers reported no trace of soot on deck chairs or other open deck accommodations throughout the voyage, and anticipate a minimum of painting and scrubbing to keep open decks bright and clean.

Equipped with similar Vortex installations on all boiler uptakes, the new America also will be free from this irritation and unnecessary expense.

The accompanying midship section drawing shows a typical arrangement of Vortex Dust Catchers, provided with a continuous ejector system which discharges automatically all soot and stack solids at the water line.

These efficient stack gas cleaning devices are manufactured by the Engineering Specialties Co., Inc., of New York, N. Y. This firm manufactures also the Vortex Spark Arrester Silencers, which are installed on many marine diesel power plants, including all the diesel units on the U. S. Army Engineers dredge Chester A. Harding; and the main propulsion units and auxiliary diesels of the M. S. Donald McKay and her sister ships.

Repowering Trawler Vagabond

In the business of fishing, as in every other business, there are certain fixed charges that must be met that cannot be controlled. The rising costs of labor, supplies, insurance, maintenance and repairs in a period of relatively low fish prices make it increasingly difficult for boat owners to show profits after a year of hard work.

Captain Westerbeke, owner of the Vagabond, was no exception, but he recognized that one factor remained over which he did have full control, namely, engine room economies. Every dollar saved in machinery first cost, operation, maintenance and repairs would be extra profit after the fish are sold and all bills paid.

The captain did some figuring, asked some questions about certain machinery developments, checked the answers against his knowledge of service conditions, and decided that the Vagabond could be made more profitable even though she caught no more fish than before or received no better prices for them. The answer to this seeming paradox was reduction in the cost of fishing. The most logical method of reducing costs in the engine room was high-speed diesels and reduction gears.

A Farrel marine reduction gear was selected, which permits the use of two compact high-speed diesels on the vessel's single screw, and saves approximately 16,000 pounds of engine room weight. Although power and speed have been increased, fuel consumption has not increased proportionately due to increased efficiency.

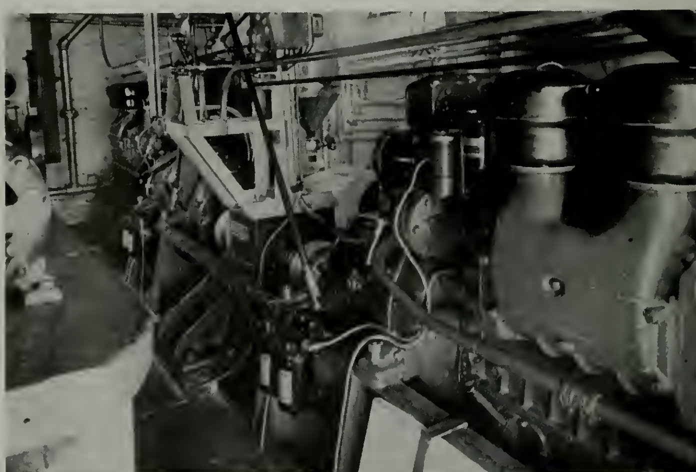
Engine spares are much cheaper to buy, easier to carry and quicker to install. In fact, all but major repairs can now be made at sea simply by uncoupling one engine from the gear. The other engine will drive the boat at about three-quarter speed. More time at sea means more fish caught, and reduced maintenance and operating costs mean more profit after they are sold. Also, the reduction of machinery weights permits better trim at less than full load, which is more often the rule than the exception.

Engines selected to drive the vessel are two Gray marine diesels, developed and built by General Motors and adapted for marine drive by Gray. Each is rated at 135 H.P. at 1600 r.p.m. They are placed fore and aft in tandem with the Farrel gear between and drive through Twin Disc clutches and Morse flexible couplings.

For twin operation, both throttles are locked together to synchronize speeds for pilot house control, but can be unlocked instantly for individual operation by the engineer. On what would conventionally be the "forward" ends of each engine are power take-offs, also fitted with Twin Disc clutches. These drive a jack shaft connected to a wash-down pump and Curtis compressor. Both engines are fitted with Burgess mufflers.

Auxiliary power is furnished by a 7½-H.P. Stover single cylinder diesel which operates the fish hoist on deck and is also connected to a generator, general service pump and compressor for the air whistle. Willard 32-volt marine batteries are used for engine starting. A Brown pyrometer from the previous installation records exhaust temperatures for both new 6-cylinder propulsion engines. Similarly, a Sentinal fuel filter has also been retained.

The Vagabond is a ship of approximately 70 gross tons, with the following principal dimensions: L.O.A., 86.0′; beam, 19.1′; draft, 8.6′. She carries a normal crew of nine and has a fish capacity of 85,000 pounds. This fish capacity is considered sufficient, and the extra carrying capacity made available by the use of Farrel gear drive has been used for extra fuel storage. Her fishing (cruising) range has thus been increased by 25 per cent. Her owner has had many years of experience with diesel fishing craft, and enjoys a well-earned reputation for knowing how to make them pay maximum dividends on his investments.



Vagabond's engine room, showing two diesels in tandem driving through flexible coupling, clutch and reduction gear.

Boilers For C-1 Steamers

Babcock and Wilcox Building Thirty-Eight Marine Type Water Tube Steam Generators for These Cargo Carriers

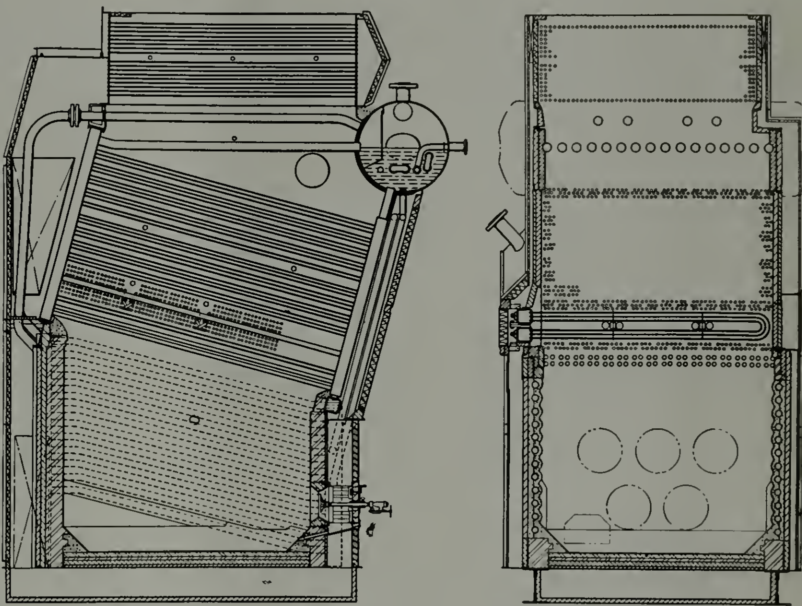
Perhaps no factor in the Maritime Commission shipbuilding program so well illustrates its widespread beneficial effects on industry as the large orders for propulsion and auxiliary machinery. A recent instance is the orders received by Babcock & Wilcox for 38 identical water tube boilers for 19 of the C-1 cargo vessels now building for the Commission.

Fifteen of these vessels are building in plants of the Shipbuilding Division of the Bethlehem Steel Company, Inc., and four in the yard of the Consolidated Steel Corporation, Los Angeles. Since five of the Bethlehem hulls are to be built in the Union Yard at San Francisco, it follows that 18 of these boilers are for Pacific Coast built ships.

The boilers are of the single-pass, marine water tube type with incorporated horizontal tubular air heaters, interdeck superheaters and drum desuperheaters. Each boiler has 2,699 square feet heating surface, designed for a normal capacity of 37,000 pounds of steam per hour at 450-pound pressure and 750° F. temperature at the superheater outlet. This boiler is capable of delivering 50 per cent over capacity, or 55,500 lbs. of steam at the same conditions.

On each of the C-1 steamers two of these boilers are arranged athwartships with a firing aisle between the boilers. With this arrangement the two boilers and the firing aisle occupy a deck space of 37′ 2″ in the beam by 10′ 8″ in length. The overall height, including the air heater, is 18′ –7½″.

The boiler casings are so arranged that air for the oil burners comes down through the air heater and between the casing and the boiler wall and underneath the furnace floor to the burners. This arrangement assures a cool boiler room and conserves much of the heat radiated from the furnace walls. There are three burners installed in each boiler. On the boilers supplied for the vessels built at Bethlehem yards, Todd burners will be used. On the four vessels building at the Consolidated Steel Corporation, the burners will be the Babcock & Wilcox Decagon C. D. type.



Longitudinal and transverse sectional elevations of Babcock & Wilcox water tube marine boiler.

Bailey combustion control will be fitted on each ship.

Diamond Valv-in-head type soot blowers are standard equipment.

TRADE LITERATURE

The Multiport Drainer, Publication 2925 of the Cochrane Corporation, a profusely-illustrated four-page brochure describing their equipment for continuously removing condensate from evaporators, heaters, separators, coils or steam lines.

The Cochrane Multiport Drainer functions as a large capacity trap, with the additional feature that flow of condensate is continuous rather than intermittent. Standard drainer applications are to closed heaters, evaporators, continuous blow-off flash tanks, process machinery and similar equipment where large quantities of liquid must be continuously drained. The wide selection of materials used in construction of the drainer meets specifications for efficient service at various pressures in power plants; paper, textile, food and process plants; on shipboard; and wherever large steam-using equipment must be utilized at maximum efficiency.

The valve mechanism consists of a completely balanced rotary-type valve, with large port area, located in the condensate chamber and operated by a float. The discharge of condensate is controlled in accordance with float position.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

● **Commercial Launches and Delivers**

On December 22, 1939, the Commercial Iron Works of Portland, Oregon, launched an all-welded steel hull oil barge 144 feet long, 35 feet beam and 8 feet depth, with capacity for 200,000 gallons of oil.

During the first week of 1940 this firm delivered the 2500-horsepower, twin screw, shallow draft, tunnel stern river towboat Keith.

On January 30 they will launch the 93 foot by 40 foot by 6 foot hull for a 15-ton Whirley derrick barge.

● **Conversion to Purse Seiner**

The Harbor Boat Building Co., Terminal Island, Calif., report that they have recently been awarded a contract to remodel a 105-foot-long hull for purse seine fishing. The job includes installation of: a 380-shaft-horsepower Union diesel engine; complete purse seine equipment; and crew's quarters.

Distribution of Maritime Commission Shipbuilding Program By Regions December 31, 1939

Atlantic Coast:	*No. Ships*	*Gross Tons*
Bethlehem Yards	26	199,400
Federal S. B. & D. D. Co.	20	152,000
Newport News S. B. & D. D. Co.	13	138,500
Pusey & Jones	2	11,800
Sun S. B. & D. D. Co.	18	157,600
Atlantic Coast Total	79	659,300
Gulf Coast:		
Tampa S. B. & Eng. Co.	8	59,200
Pennsylvania Shpyds., Inc.	2	11,800
Ingalls Iron Wks. Co.	8	72,400
Gulf Coast Total	18	143,400
Pacific Coast:		
Bethlehem (Union)	5	32,000
Consolidated Steel Corp.	4	25,600
Moore Dry Dock Co.	4	35,600
Seattle-Tacoma Shipbuilding Corp.	5	32,000
Western Pipe & Steel Co.	5	32,000
Pacific Coast Total	23	157,200
Grand Total	120	959,900

ADDITIONS

Official Number	Rig	Name of Vessel	Material	Gross	Net	Dead Weight	Speed	Year	Owner	Home Port
239103	St.s.	*Explorer*[1]	Steel	6,736	3,996	9,000	17.0	1939	U. S. Maritime Commission	New York, N. Y.
239070	St.s.	*Flying Cloud*[1]	..do.	6,085	3,597	9,500	16.0	1939	...do........................	Do.
239064	St.s.	*Nightingale*[1]	..do.	7,169	4,328	9,300	15.5	1939	...do........................	Norfolk, Va.
238891	St.s.	*Red Jacket*[1]	..do.	6,085	3,597	9,500	16.0	1939	...do........................	Rockland, Maine

SUBTRACTIONS

Official Number	Rig	Name of Vessel	Material	Gross	Net	Dead Weight	Speed	Year	Owner	Home Port
217905	St.s.	*Beaconhill*[2]	..do.	6,941	4,295	10,387	11.0	1919	Standard Oil Co., of New Jersey Inc.	Wilmington, Del.
213899	St.s.	*Charles Pratt*[2]	..do.	8,982	5,644	14,900	11.5	1916	...do........................	Do.
219012	St.s.	*Deon Emery*[2]	..do.	6,664	4,148	10,530	10.5	1919	...do........................	Do.
214040	St.s.	*Edgor F. Luckenbach*[3]	..do.	6,013	3,787	13,000	12.0	1916	Luckenbach S. S. Co., Inc.	New York, N. Y.
218629	St.s.	*Geo. R. Jones*[2]	..do.	6,914	4,273	10,500	10.5	1919	Standard Oil Co., of New Jersey Inc.	Wilmington, Del.
214066	St.s.	*H. H. Rogers*[2]	..do.	8,807	5,488	14,900	10.5	1916	...do........................	Do.
216456	St.s.	*H. M. Flagler*[2]	..do.	8,207	6,183	11,375	10.5	1918	...do........................	Do.
220513	St.s.	*I. C. White*[2]	..do.	7,052	4,381	10,600	10.5	1920	...do........................	Do.
214816	St.s.	*James McGee*[2]	..do.	9,859	6,161	14,900	10.5	1917	...do........................	Do.
220787	St.s.	*Joseph Seep*[2]	..do.	7,088	4,419	10,500	10.5	1920	...do........................	Do.
217501	St.s.	*Scanstates*[4]	..do.	5,163	3,164	7,825	11.5	1919	Moore-McCormack Lines, Inc.	New York, N. Y.
213154	St.s.	*Standard*[2]	..do.	9,724	6,138	17,000	10.5	1914	Standard Oil Co., of New Jersey, Inc.	Wilmington, Del.
215284	St.s.	*W. C. Teagle*[2]	..do.	9,551	5,920	14,900	10.5	1917	...do........................	Do.

(1) New ships. (2) Sold to Panama Registry. (3) Collision. (4) Sold to Brazilian registry.

Growth of American merchant marine during November, 1939.

● Lake Union Delivers Snag Boat

On the 8th of January the Lake Union Dry Dock and Machine Works of Seattle, Wash., delivered to the U. S. Army Engineers the sternwheel steam drive snagboat Preston for work clearing navigable streams in the Pacific Northwest.

● Lake Washington Gets Barge

The Lake Washington Shipyards of Houghton, Wash., report that they have recently been awarded an order to build an all-welded steel barge for the Standard Oil Company of California. This barge will have a capacity of 4,750 barrels of oil.

● Union Oil Tanker Launched

On January 6 the Sparrows Point yard of the Shipbuilding Division of the Bethlehem Steel Company, Inc., launched a new tanker for the Union Oil Company of California and christened the vessel Victor H. Kelley. This vessel, built at a cost of $1,800,000, is a sister ship to the Union Oil tanker L. P. St. Clair, delivered by the same yard on February 28, 1939.

She is of the single screw, American three-island-profile tanker type with raked stem and cruiser stern.

With a B. P. length of 442 feet, a beam of 64 feet and a depth of 34 feet 10 inches, she has a gross measurement of 8,066 tons, and carries 101,400 barrels of oil in her cargo tanks and 10,500 barrels of fuel in her bunker tanks.

Two water tube boilers supply steam to a set of cross compound, double reduction geared turbines delivering 3,300 normal shaft horsepower at 85 r.p.m. of the propeller shaft under steam throttle conditions of 375 lbs. pressure and 725° F. temperature at the steam throttle, and a vacuum of $28\frac{1}{4}$-inch Hg at the exhaust flange. These conditions produce a fully-loaded speed of 13 knots.

The cargo pumps will have a total capacity of 3,500 barrels per hour.

The hull is built on the Bethlehem-Frear system of tanker construction, involving connected longitudinal framing and fluted bulkheads.

● Bushey Starts Building Four

Ira S. Bushey & Sons, Inc., of Brooklyn, N. Y., believes the ship market is good, and has started four hulls on his own account. These comprise 2 steel hull tugs and 2 wood hull barges.

The tugs, 90 feet by 23 feet by 10 feet, will each be powered with an 805 - shaft - horsepower Fairbanks Morse diesel.

The barges are to be 118 feet long, 36 feet beam and 10 feet depth.

All four craft are to be finished in 1940.

● Federal Launches C-3 Cargo Ship

On January 27 Federal Shipbuilding and Dry Dock Co., Kearney, N. J., launched the C-3 cargo vessel Sea Fox, first of six sister ships. These vessels are allocated to round-the-world service as cargo liners. They will have a sustained sea speed of better than 16 knots and will carry approximately 10,000 deadweight tons of cargo.

● Three More Hulls for Ingalls

The Ingalls Shipbuilding Corporation report award of a contract from the Socony-Vacuum Oil Company to build a river towboat 147 feet long,

35 feet beam and 7 feet 6 inches deep. This boat will be completed about August 1, 1940.

This firm has also received a contract to build two oil barges for the Panama Canal. Each barge will be 93 feet long, 36 feet beam and 10 feet 6 inches deep. Both barges are for delivery in May, 1940.

● Levingston Busy

On January 1 the Levingston Shipbuilding Company of Orange, Texas, delivered an all-welded, steel-hull, diesel-electric automobile and passenger ferry with a length of 185 feet 2½ inches, a beam of 55 feet over the guards, and a depth of 15 feet 6 inches.

This ship is powered with a General Motors diesel of 950 H.P. driving an electric generator, and one 750-H.P. motor driving the propeller shaft. She is for the Electric Ferries Inc. of New York.

Later in the month, Levingston delivered an all-welded steel towboat to W. G. Coyle & Co. of New Orleans. This boat, 80 feet long, 22 feet 7 inches beam, and 9 feet 6 inches depth, is powered with a 550-H.P. diesel engine.

Levingston reports new orders for:

A steel single-screw, diesel-drive towboat for the Pan American Refining Co.;

A second diesel-electric ferry, sister to the one delivered January 1, and for same owners; and

Four all-welded steel barges for the Pan American Refining Co.

● Sun Delivers First of Four

On January 18 the Sun Shipbuilding & Dry Dock Company delivered the C-3 motorship Mormacpenn to the Moore-McCormack Lines Inc. of New York. This vessel is the first of four sister ships building at this yard.

The power plant on each of these vessels will comprise four 2,250 S.H.P. Busch Sulzer diesel engines each driving a pinion meshing with a large gear mounted on the single propeller shaft. Each engine will drive its pinion through a Westinghouse electro-dynamic coupling. The gears are designed and built by the Falk Corporation. The diesel engines will each have 7 cylinders in line, each cylinder being of 20½-inch bore and 27½-inch stroke.

The normal rating of this engine is 2,225 at 240 r.p.m., and the combination of the four engines is designed to deliver 8,500 shaft horsepower to the propeller at 85 r.p.m. Each engine must be able to operate continuously at 10 per cent overload, and for two hours at 25 per cent overload. For any emergency, therefore, the propeller would have better than 11,000 shaft horsepower available.

● Tampa Launches Second C-2

On January 10 the Tampa Shipbuilding and Engineering Co. launched for the Maritime Commission the second C-2, their hull No. 34, and christened her Shooting Star. This is the second of four C-2 ships building at Tampa, each of which is being powered with a geared diesel drive consisting of two 2-cylinder, single-acting, directly-reversible, 2-cycle, mechanical-injection Nordberg diesel engines.

● Berkeley Construction Gets Contract

The Berkeley Steel Construction Company, Inc., Berkeley, Calif., was awarded a contract for two welded steel towboats for the Panama Canal. Each hull will be powered by a 200-shaft-horsepower Enterprise diesel engine.

Officers of the company are T. S. Neilson, president, and D. S. Neilson, vice-president. From 1911 to 1920 "Tom" Neilson was superintendent of hull construction for the Seattle Construction & Dry Dock Company, where 14 vessels were built, and works manager for the Seattle North Pacific Shipbuilding Company, building 10 vessels. In 1920 he joined the Moore Shipbuilding Company. Later he founded his own firm with his brother, Duncan. Both Neilsons served apprenticeship on the Clyde.

Our Seagoing Personnel

(Continued from Page 25)

Inspection and Navigation is about to be tried but having no power or authority.

In undertaking the task of preparing examination questions to be offered to the local inspectors for possible use, the Bureau needs to gain a better understanding of the importance of reasonably high standards of scholarship and knowledge of nautical science. The local boards now issue 98 kinds of officers licenses, counting tonnages in 500's and the several grades for the different types. There are also issued six types of certificates to unlicensed personnel.

The total number of licenses extant is something more than 2.5 times the total number of possible officers' berths, if all American flag vessels were in full commission.

Recent legislation will require additional certificates of competency, issued without a written examination, for officers in charge of all vessels over 200 gross tons. Well over 99 per cent of all candidates for licenses pass at the hands of the local boards. Reports from the British Board of Trade indicate that 60 per cent of the candidates fail in their first attempt and the average number of attempts is 2.7 per man.

The usual program of examinations for British Board of Trade engineer's license provides three hours for each of the following sections: Monday, two papers on general engineering knowledge; Tuesday, one day of practical mathematics; Wednesday, drawing; Thursday, oral examinations; Friday, oral examinations. The examiner conducting the oral examinations gives the candidate a real experience, starting with any doubtful sections of the candidate's written papers, continuing with a thorough appraisal of the candidate's resourcefulness and capacity.

The British Board of Trade licenses, which we in this country have been calling "Extra Chief's," and should be called "Extra First Class" (commonly known among the British as "Extra"), are purely an honorary matter, not required by law. A higher theoretical knowledge is required, but there is no oral examination. In the written examination there is included a real technical paper to be written. A man may sit for the Extra Master examination when he is qualified for Master and no extra sea time is required. Twenty per cent of the number of men attempting the Extra Master examination will pass.

Our law still gives an unlicensed man the choice of a Continuous Dis-

charge Book or a Certificate of Identification and the privilege of changing back and forth between the two at will. The maximum number of changes made by one man has been fifteen, resulting in a needless amount of clerical work at the central records files.

Reports from several sources indicate that the quality of men signing on as replacements is generally rising, that the men now comprising our merchant marine are better trained, more experienced, and increasingly better fitted for their tasks in all respects save one—the attitude of crewmen toward their superior officers. Discipline should be based on mutual respect. It is not to be inferred that all of our men are inefficient. On the contrary, many fine records have been made by our seamen and we have the lowest casualty record of any maritime nation.

With the weeding out of the unfit, with the cessation of evil preachings to which sailors seem peculiarly gullible, with the recognition of the fact that the sea is not a place for men unsuccessful in other pursuits, and with an awareness on the part of all concerned that to meet a certain definite responsibility there must be a correspondingly definite amount of authority, it is to be hoped that our merchant marine personnel will meet its opportunities for rising to adequate standards of ability and performance.

The suggestion has been made that attention should be given to the status of radio operators as a necessarily loyal center of communications to and from the master of the ship. From the standpoint of national defense they might be enrolled in a government service, if this seems necessary to secure their allegiance, but it is obvious that every officer and responsible person in every department has it within his power, if he were to permit a temporary inadvertence, to do irreparable harm to all on board. The necessary loyalty must be found within and nurtured by a favoring environment for all concerned.

Some progress has been made in the use of continuous articles, with salaries paid as advances, but the law still envisons long voyages fraught with misadventure and the seaman as the "ward of the Admiralty." The new law on allotments is an example of patch-work improvement, but the entire procedure of contractual relations for ship personnel should be revised in so far as the Government undertakes to umpire fair play between employer and employee. If the legislative structure be studied and revised, and proper government agencies equipped to maintain desirable standards in the licensing or the certificating of personnel, perhaps the public would then be willing to accept these documents as more accurate evidence of proficiency and capacity.

The Bureau's recent efforts, through its traveling inspectors and its publications, to educate maritime personnel in safety subjects are most commendable. A real service has been done by issuing instructions on standard station bills, emergency drills, emergency squad organizations, pointing out unsafe practices in small as well as larger craft and in calling attention to meritorious performance. The same sort of educational work is also being done by several voluntary organizations.

Statistical and Transitional

There is no way of knowing with accuracy the total number of seamen actually employed in our merchant service. From the shipping agreements, as signed and published, one may learn how many men are needed to man our principal fleets. Omitting small and pleasure craft and the fishing fleets the figures for 1938 would indicate that 151,000 men are called for in the crews of freight, passenger, tanker and towing vessels. If the towing vessels are omitted, it would appear that 132,200 sea jobs still remain in existence on the ocean-going vessels.

An index of the number of men employed at sea in recent years also is to be found in the number of shipments of men as certified on the articles by the United States Shipping Commissioners and the Deputy Collectors of Customs. In the table herewith comparisons for each twelve-month period in the figures of shipments for 1936, 1937 and 1938 are shown. While the same ship and the same man may appear many times in the same year the repetitions remain a fairly constant factor. The figures were taken from "Merchant Marine Statistics" published annually by the Bureau of Marine Inspection and Navigation. The operating twelve-month periods end on June 30 of each year.

Years	1936	1937	1938
Total number of shipments	255,531	227,486	211,063
Total number of shipments by U. S. citizens	213,421	196,692	190,228
Ratio of U. S. citizens to total per cent	83.5	86.4	90.1
Number by naturalized citizens	51,703	45,703	48,619

By the reductions in numbers shown these figures reflect both the effects of the general commercial situation in the country and abroad, the disturbed

labor conditions and the result of the application of some sections of the Merchant Marine Act of 1936 on shipping.

One of the provisions of the Merchant Marine Act of 1936 which has had a very direct effect upon our personnel is the drastic restriction on the service of aliens aboard United States vessels, especially vessels receiving government aid. These restrictions were in force during the latter part of the 1937 period but their full effect can be seen only in 1938. The pressure exerted by the act compelled many aliens to secure their naturalization papers so that, although the number of citizen shipments shrank by more than 6000 from 1937 to 1938, the number of shipments by naturalized citizens actually rose by nearly 3000.

Relationships between owner or manager and the sea personnel and relationships between licensed and non-licensed members of the crew are being challenged, modified and refined. The former distance between the master of the ship and his crew is lessened. Today there is no such complete control of the person and liberties of a seaman by his captain as in former times, although the basic responsibility for the entire ship always rests ultimately with the master. This responsibility is as real as ever despite the complex departmental setup on a modern vessel which may seem to obscure its reality and extent. It is a far cry from the former relation between officer and seaman to that on many ships during the last year or two. It is unfortunate that an officer should be handicapped by having his own collective bargaining unit tied in to that of the men he commands.

Present efforts to make our ships safe are an enormous step forward. Every known type of hazard is dealt with and real efforts in safety education are noticeable on most of our ships. Safety is more mental than mechanical and the work of ships' safety committees, the use of posters and the thought - provoking discussions in safety meetings aboard ships at sea are much to be appreciated. Safe operation of the vessel is one of the most essential of several grounds for mutual interest between the ship operator and his sea personnel, but there are others of equal importance. In the case of passenger vessels the service rendered should be exactly comparable to that of a good hotel and the success of a freight service depends on the efficient planning and expert cargo handling. Sea personnel should realize that all records for efficiency are the result of cooperation—that coopera-

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Trade Pacts and Shipping

(Continued from Page 19)

agreement went into effect in September, 1934. During the first three years of the agreement, Cuba increased her imports from us 193, 292 and 231 per cent. The imports from other countries, meanwhile, increased only 87, 107 and 57 per cent. These figures show, first, that the expansion of our foreign commerce which has taken place during the past six years was not accidental; secondly, that it was a sustained recovery and not a flash-in-the-pan.

The Hull Program has increased trade. A fact that is of special importance to the shipping industry is that trade has been increased both ways.

The Program has also been of direct benefit in another way. Trade agreements, by their very nature, tend to stabilize foreign commerce. Security in the shipping industry is likely to depend, in final anlysis, upon a reasonably steady flow of goods between nations. This is especially true of American shipping. Tramp owners are able to adapt themselves to, and even benefit by, violent fluctuations in the flow of goods. The American Merchant Marine, which consists almost exclusively of liner services, cannot help but be injured by such fluctuations. The Program, by encouraging a healthy two-way trade, and thus encouraging stability in our foreign commerce, has contributed much to prosperity and employment in American shipping.

The indirect benefits of the Program are no less important. Shipping, like many other industries, is extremely sensitive to the general health of the national economy. When the country as a whole prospers, shipping prospers; if the country goes into a decline, shipping also goes into a decline.

There is one more angle that is of interest to all of us. I refer to sane commercial relationships as a factor for peace. Trade certainty won't keep nations from fighting with each other—at least it never has—but they are less likely to fight if they do business on a mutually advantageous basis. Most of us have come to realize during the past 20 years that, although political events occupy the stage, the destiny of nations generally is decided in the cold, hard realm of economics. Anything that contributes to the well-being of the peoples of the earth is an influence for peace.

The Trade Agreements Program attacks this problem two ways. In the first place, by increasing trade on a reciprocal basis, it contributes to the welfare not only of our own people but also of those with whom we do business. Secondly, by repudiating the idea of economic aggression, we have endeavored to create an atmosphere favorable to the solution of the impasse which has developed in foreign affairs during the past decade. The fact that a good share of the earth's peoples are at war should not cause us to abandon our Program; rather, it should cause us to put more stress on those principles which we believe to be essential to the maintenance of progress and peace.

Good Fellows get togther!

Friends Honor Marine Executive At Annual Party

By Jim Hines

Herman Esselborn of the Standard Oil Company of New Jersey

One of the best anniversary parties which ye olde publisher has to report is the one which was tendered on December 21, 1939, by **Mr. Herman J. Esselborn,** Manager of the Operating Division, Marine Department, Standard Oil Company of New Jersey, to a large group of his congenial friends. This party was the culmination of twenty years of similar get-togethers, the first one having been an impromptu affair which was held at Sid Ackermann's on William Street, New York, participated in by six of Mr. Esselborn's friends and himself. During the ensuing years, the annual celebration grew in size and was held in such places as Max Schumann's in Hoboken, and Conti's, The Whitehall Club, Elks Club and the Downtown Athletic Club in New York. A general idea may be had of the manner in which the party has grown from the fact that for this last one 117 invitations were issued by the host, and the very few friends who were unable to accept were either ill or out-of-town.

This annual party has become a great event, looked forward to with enthusiasm each December by Mr. Esselborn's friends. Among the most recent attendants were Captain B. B. Howard, Messrs. Robert F. Hand, Ira Campbell, John Reilly, Fred B. Dalzell, James French, Cuthbert Hague, Frank Belcher, Captains H. A. Cunningham and W. C. Brodie, and Messrs. S. W. Hamilton, John Loughrey, Joe Laurie Jr., David Mallon, Richard K. Kelly, E. L. Stewart, B. H. Winans, Charles Heyl, Casey Jones, B. E. Lalor, etc.

The attendance of so many prominent persons in the marine industry and other fields is indeed a wonderful tribute to Mr. Esselborn and his reputation as a genial host.

McCormick Distributes Brazil Yearbook

The McCormick Steamship Company, managing owners of the Pacific Argentine Brazil Line announce their appointment on the Pacific Coast as distributors for the 1940 edition "Brazil Yearbook and Manual." This book has been written by two well known experts in United States Brazil trade relations, **Mr. John W. Brunk,** former American Vice Counsel in Brazil, and **Hugo Franklin,** Brazilian Consular Attache in New York City. It is not a book of glittering generalities, but a compendium of hard facts; an indispensable manual for manufacturers, exporters, freight forwarders, bankers, travel agencies, chambers of commerce and others interested in trade relations with Brazil. Those who wish to export their products to the ever growing Brazilian market will find everything they want to now in this handy volume. It is equally valuable to manufacturers seeking new sources of raw materials.

PACIFIC MARINE *Reviews*

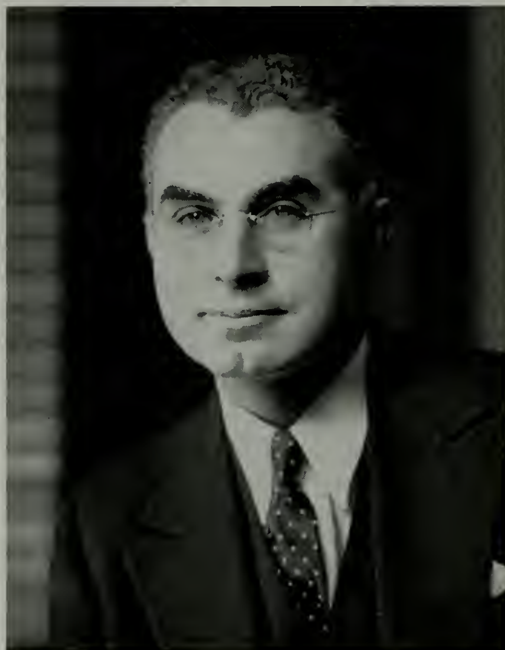
Texaco Personnel

Called to a New York post as national sales executive for his company, **R. T. Herndon**, vice-president of The Texas Company of California, was today receiving congratulations from a widespread circle of friends in the California oil industry.

Here from Chicago to succeed Herndon is **D. E. Beaton**, long connected with the oil firm in various executive capacities in the midwest, and the south. The promotions are effective immediately, and Herndon is making plans to leave for New York very shortly.

Herndon has been in charge of Pacific Coast sales activities of his company ever since the establishment of Texaco in this area ten years ago. He has served the petroleum firm over a period of 24 years since 1915, interrupted only for overseas war service in 1917-1918 with the 90th Division Artillery. Herndon has directed Texaco sales campaigns from headquarters in El Paso, Denver, Minneapolis, Boston, and New York City.

At 44 years of age, Herndon will be one of the youngest executives ever appointed to eastern sales headquarters of the oil company, whose operations embrace all the 48 United States and more than 100 foreign countries. Herndon is married, has two children, and has been a resident of Arcadia.



R. T. HERNDON

Matson's Bailey On C of C Board

At the annual election of the San Francisco Chamber of Commerce on Tuesday, January 9, the following directors were elected to serve during 1940:

F. A. Bailey, Victor E. Breeden, Francis Carroll, H. D. Collier, Harold K. Crane, Marshall Dill, Arthur J. Dolan, Jr., Edw. E. Eyre, B. J. Feigenbaum, Daniel E. Koshland, Dan E. London, A. C. Mattei, A. T. Mercier, Wilson Meyer, Edward V. Mills, Fred W. Pabst, Charles Page, Russell G. Smith, M. R. Sullivan, Charles H. Turner and Clarence M. Young.

SPERRY EMPLOYEES HONORED AT 15-YEAR CLUB DINNER

Sixteen employees of the Sperry Gyroscope Company, Inc., having completed twenty years of service during the past year, were honor guests of the Sperry Employees' 15-Year Club at dinner recently in the Grand Ballroom, Hotel St. George, Brooklyn. **R. E. Gillmor**, President of the Sperry Company, presented a gold watch or a silver service to each of the honor guests.

The Sperry 15-Year Club now numbers two hundred fifty employees, and of this number one hundred sixty-three have completed twenty or more years with the company.

Frederick F. Narvesen, Assistant Chief Engineer and President of the Club, presided at the dinner. **Carl F. Carlson**, Foreman Electrical Department, was Chairman of the Entertainment Committee.

THOS. A. SHORT REPRESENTING CRAMP PROPELLERS AND PARSONS WHITE BRASS

Cramp Brass and Iron Foundries Company, subsidiary of The Baldwin Locomotive Works of Philadelphia, announces the appointment of Thomas A. Short Company of 575 Howard Street, San Francisco, as their Pacific Coast representatives for Cramp propellers and Parsons' "White Brass."

Cramp Brass and Iron Foundries Company have furnished propellers for many of the largest American passenger and cargo liners. Their "White Brass" is favorably known to marine engineers as a metal that stands up well in heavy duty bearings for seagoing service.

United States Maritime Commission
Washington, D. C.
January 26, 1940

Mr. Bernard N. DeRochie
Vice-President
Pacific Marine Review
500 Sansome St.
San Francisco, California

Dear Mr. DeRochie:

Thank you very much for sending me fifteen complimentary copies of the very handsome edition which you dedicated to the Maritime Commission. I have distributed these to those whose pictures appeared in the issue and find that we could use about six more, if you can spare them.

I have gone over the magazine carefully and think you have done a splendid job. We all appreciate the compliments paid to us and our work, and I feel that your presentation of our efforts will give the public a clearer picture of what we are trying to do. I have heard many favorable comments from shipping people here who have seen the articles.

With very best wishes, I am,
Sincerely yours,
H. L. VICKERY
Assistant to the Chairman

News of "The Bilge Club"

By William A. Mason
Lieut. Commander, U. S. Navy
(Retired)

Called by President Dan Dobler, Marine Superintendent of the Texas Oil Co., the Directors of the Bilge Club met recently at their headquarters in the California Yacht Club to discuss plans for the Club's Annual Banquet.

The following Chairmen of the respective Committees were appointed:

Dan Dobler, General Chairman; Hampton Neergaard, Decorations; Lloyd Moore, Entertainment; Al Johnson, Dinner and Refreshments; John Eidom, Reception; Fred Archbold, Attendance; John Logan and Ed Nelson, Finance and Secretarial; W. A. Mason, Publicity.

A committee which had been appointed some time ago reported that they had been unable to locate suitable accommodations anywhere in the Harbor Area for this event, consequently the Annual Banquet will be held, as heretofore, in the Biltmore Hotel, Los Angeles. The date, Saturday, April 6th.

W. A. MASON,
Publicity.

News of the Propeller Clubs of the United States

The Port of San Francisco

Tirey L. Ford
President
Frazer A. Bailey
First Vice-President
Charles L. Wheeler
Second Vice-President
Joseph R. Sheehan
Third Vice-President
Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS
Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

Members of the Port of San Francisco club are anticipating an interesting presentation by **James A. Quinby**, admiralty attorney of San Francisco, when he addresses the organization Tuesday, February 6, on the subject "The Drama Behind the Law of the Sea."

Speaker Quinby is well-versed in claim procedure and his talk will be devoted to interesting experiences and anecdotes in the investigation of claims . . . and, incidentally, claimants. Quinby has had years of intimate contact with the steamship business in the San Francisco district and his remarks will carry real maritime flavor.

An important feature for future programs will be inaugurated at the February 6th meeting whereby the San Francisco members will be brought up to date on the accomplishments of other Propeller Ports. Inaugurating this new series of short resumes, **Captain Henry Blackstone** will address the Club at this February get-together.

Frazier A. Bailey, first vice-president of the Port of San Francisco, has been selected as Chairman of the Day.

A great deal of advance interest has been manifested in this February meeting, and an enthusiastic attendance is anticipated.

The Port of Tacoma

The first dinner and meeting of the Propeller Club, Port of Tacoma, for the year 1940, was held Tuesday evening, January 16th, at the Tacoma Hotel.

This was the first meeting presided over by our new president, **J. L. Moore,** who was greeeted by a larger membership than has been in attendance for many months.

Previous to the regular business session, our new President introduced prospective members who were our guests for the evening. They included Leroy J. Rogers of the Weyerhauser Steamship Co., G. J. Ackermann of the Weyerhaeuser Timber Co., Wm. C. Theda, Local Manager of the Centennial Flour Mills, and Thos. J. Firth of the U. S. Coast Guard.

The first matter brought before the club by Pres. Moore was the payment of the 1940 dues. The President also informed the club that the chairman and members of the Ways & Means Committee would be appointed at our next monthly meeting.

The President also gave a few remarks pertaining to our membership drive and various members were given the names of parties whom they were to contact in an endeavor to add their names to our membership list.

The next matter brought forward was the resolution concerning the approval of the sale of American ships to foreign interests. This resolution was heartily endorsed by all who were present.

It was also decided at this meeting that we hold a so-called "Jack pot" at each session, the lucky recipient, if at the meeting, to give half of his money to the Tacoma Sea Scouts to help in financing the construction of their boat, the "Albatross." If the party whose name was called was not in attendance, the total amount of money received was to be turned over to the Scouts.

As the principal speaker of the evening, Lieut. Comdr. N. S. Haugen, Director of the Coast Guard Reserve for the Seattle District, was introduced. Lieut. Comdr. Haugen spoke briefly in connection with the service performed by the Coast Guard. Immediately after his talk, a special sound film was shown which showed in detail the duties of the U. S. Coast Guard service. This picture was one of the finest ever shown at a Propeller Club meeting in Tacoma.

After the showing of the Coast Guard picture, the meeting was adjourned by Pres. Moore.

CHAS. C. CRAMP,
Secretary.

EL "PROPELLER CLUB" ORGANIZADO AYER EN SAN JUAN

El senor Arthur M. Tode vino de Estados Unidos especialmente con ese proposito.—
Fue electo presidente el senor Manuel G. Casseres

Officers and Board of Governors at Presentation of Charter by the Propeller Club of the United States to Propeller Club, Port of San Juan, P. R., (Port No. 72), Palace Hotel, San Juan, January 2, 1940. Front row, left to right: E. G. Lassus, Treasurer, Propeller Club, Port of San Juan; E. Larroca, Vice-President, Propeller Club, Port of San Juan; Arthur M. Tode, Honorary President, The Propeller Club of the United States; Manuel G. Casseres, President, Propeller Club, Port of San Juan; Brigadier General E. L. Daley, U.S.A., Honorary Member, Propeller Club, Port of San Juan; W. L. Swain, Secretary, Propeller Club, Port of San Juan. Rear row, left to right: (Board of Governors) A. Lugo Vina, F. Vidal, F. B. Crocco, Arturo Geigel, Carlos Ball, W. J. Truss, John Bradley, Charles R. Hartzell. Missing: (Board of Governors) Miguel Such, Comdr. W. F. Towle, USCG.

Seventy-Second Port Is Hailed!

SAN JUAN PUERTO RICO RECEIVES CHARTER AS 72ND PROPELLER CLUB

Four hundred and forty-seven years after the coming of Christopher Columbus to Puerto Rico in 1493, The Propeller Club of the United States arrived at San Juan on January 2, 1940, on which date the 72nd Propeller Club Port was officially chartered.

For some time past there had been discussion amongst the shipping officials of this important island under the American flag to organize a marine club. They had observed with growing interest the expansion of The Propeller Club of the United States. It was felt that Puerto Rico could profit by becoming a link in the strong chain being forged by American shipping men in many localities to improve local marine conditions and to further the expansion of passenger and freight traffic via American flag routes.

Prior to his sailing from San Juan, P. R., for the United States on December 28th aboard the S. S. Borinquen of the Porto Rico Line, Governor Willaim D. Leahy of Puerto Rico met with Honorary President Arthur M. Tode of The Propeller Club of the United States and several local shipping officials. The Propeller Club idea was not unknown to the Governor. On several occasions during his recent tour of duty as Chief of Naval Operations at Washington, Rear Admiral Leahy had been consulted by and given excellent advice on organization and shipping matters to officials of The Propeller Club of the United States. With a full realization of the needs for a substantial merchant marine as a commercial carrier and as an adjunct to the Navy, Admiral Leahy had always expressed whole-hearted approval of the organization's activities "To Further, Promote, and Support an American Merchant Marine."

While being interviewed at San Juan, Governor Leahy declared bluntly that in his opinion a Propeller Club was needed in Puerto Rico. "The combined efforts of those interested in the further develop

(Pease turn to Page 66)

Our Seagoing Personnel

(Continued from Page 48)

tion must work both ways, and that in the long run a happy and sweet ship is the only profitable ship, both to the company and to the men.

What are the forces which might tend to make the sea attractive to the type of young men considered desirable as cadets and as replacements in the future? In other countries, for a long time, there have been built up certain safeguards while in active service and provision for independence after the earning period is over, similar to that available to all other workers. Continuous service with the same company is highly regarded; vacations with pay have long been the rule; a certain amount of social security protection has been given as a matter of course. The answer to this problem as regards American seamen is not yet simple nor plain. It is receiving some attention, noteworthy action being that of the Maritime Commission's recently announced longevity payments and the efforts to provide suitable types of training for all ranks and ratings.

One most interesting habit among our seamen may be noted. A large number of men are now practicing the habit of saving money regularly, because more convenient facilities have at last been provided. The recent change in the law which permits Savings Banks to receive allotments on the same basis as next-of-kin is a great forward step. This change had been warmly advocated by the various agencies providing care for seamen while ashore, which agencies constantly met a real demand for such privileges. Seamen in the Port of New York alone have on deposit far more than half a million dollars, a good evidence of a great change in the use of money by them. Reports from the Great Lakes banks and steamship companies indicate equally good evidence of thrift on the part of their seamen.

What Is Needed Most?

Many years ago we thought the railroad labor organizations were hardly representative of their truly good personnel. Today we consider their organizations, in general, rather conservative and representative. Must we go through a protracted period of evolution in the marine field also, or could we learn by experience from the railroad situation and discover some way to save from further costly and precarious existence an industry which is so essential to commerce and national defense? Social changes proceed with aggravating slowness and seem destined to be born in misery, especially when technological developments are complicated by political, organizational and selfish influences. It seems intolerable that this great nation cannot find the solution to the problem of securing true understanding between men and management except by the long and costly attrition of the ancient "survival of the fittest" doctrine. This author wishes emphatically to state that of course he is for and not against unions, but they must be unions with high ideals, run to merit respect. Ownership too must be well organized and it is probable today that some owners, as they look in retrospect, realize that they waited a little too long before giving attention to the needs of the men in these days of generally improved conditions for the American workman.

The owner still is responsible for efficient and safe operation of ships and terminals. He should have the authority, which must accompany this responsibility, of separating an incompetent man from a job, when such incompetency has been accurately and fairly determined. It is astounding to read an authentic announcement that the principal duty of a maritime labor union is to prevent a permanent agreement with its common enemy, the shipowner.

Whether or not a rubescent red label eventually may be applied to a labor leader does not matter as much as the fact that he has pronounced sentiments which declare definitely and apparently exclusively for a pattern of (thought) regarding the owners as enemies, to be fought at every turn, or else they will destroy his unions. This is a philosophy of despair and any leader of sea labor who feels that this sort of policy is necessary shows such a limitation in wisdom as to make the impartial and long-suffering public regard him as unsatisfactory for such leadership.

It has been shown repeatedly that a new collaboration of labor and capital is possible whereby each felt itself the partner of the other. Without government interference, the National Maritime Board in England has accomplished this and with no government action in the working out of the mediation panels.

In all cases there is need for the owners to establish themselves as devoted to the highest ideals of humane and far-sighted action for the mutual good of all concerned, including the public. If it takes the owners five years, according to one authority, to develop one of their personnel men to deal on the highest plane with union representatives, how important is it for union leaders to study and develop their own capacities to a degree equally satisfactory to their own membership.

Labor recently has made tremendous strides in organization and acquisition of power in the execution of contracts. The best elements within the labor groups are ready and willing to recognize that their newly acquired strength carries with it the responsibility scrupulously to abide by contracts and agreements. The public seldom hears of the many disputes and controversies that are settled without tie-ups—there being no "news value" in such successes. The agreements must be of such a character that they will be observed by both parties. Tremendous losses to the men as well as to the long-suffering public have made the saner labor leaders realize that self-interest calls for discipline and integrity within their ranks. It would appear better to have all disputes settled on the basis of agreements within the industry rather than by the Government, because the inherent weaknesses in existing agreements would be corrected more quickly as they come to light, requiring only general supervision in scope and standards by the Government.

There is no reason why the ordinary rules of integrity and honesty should not apply to a labor contract as well as to any other contract. When both sides realize that all that is needed is a patient, courageous adherence to the recognized principles of honest behavior, which should go into the making and keeping of contracts, then the best interests of both parties will have been secured.

Keith -- A Swift-Water Towboat

(Continued from Page 27)

connected to the engine by a hollow intermediate shaft supported between Thomas flexible couplings to give complete axial distortion freedom to the main engine. This type of drive and mounting has been adopted to reduce stress and vibration in the light steel hull, and to avoid strains in the main engine and shaft system from possible distortion of hull through her operation in the rapids. These engines are cooled by means of closed fresh water circuit through Harrison heat exchangers. Harrison oil coolers keep the lubricating oil at right temperature.

The propellers are Coolidge design, 3-bladed, 53 inches in diameter and 37-inch pitch. The tail shafts are carried in Goodrich Cutless rubber bearings.

The engines are equipped with Alnor pyrometers, Weston ammeters, Zero Lash hydraulic tappet clearance takeups, and each carries at 21½-cu.-ft. Curtis air compressor.

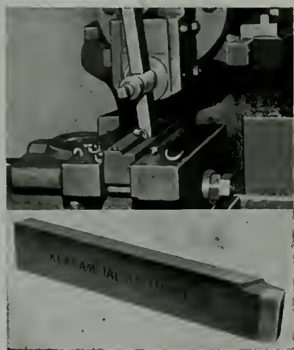
Auxiliaries consist of one single-cylinder General Motors 10-kilowatt generating set and an auxiliary air compressor. Starting air at 350 lb. is carried in four 22-inch x 70-inch air bottles, reduced to 200 lb. for normal operation. A 15-KW. G.E. generator, 110 volts, charges a 56-cell National battery set.

An important feature of the new tug is the unique, fast-acting pneumatic rudder system. Two main rudders located aft of the propellers are operated by air rams supplied by Klingbeil-Oetinger Co. of Portland. The two monkey rudders located forward of the propellers are operated by Thor air motors.

A complete swing of 180 degrees of the rudders may be made in 2 or 3 seconds at full speed.

In connection with the Keith, the barge Inco No. 1 was completed in December by Commercial Iron Works of Portland. This is an all-welded steel tank barge, designed especially for swift-water operation. The new barge is 164 x 34 x 7 ft. draft and 9 ft. deep, with a 14-inch draft light. She carries 300,000 gallons of gasoline in 8 tanks, each equipped with side-expansion tanks. A Ford V-8 engine supplies power for the Byron-Jackson 8-inch centrifugal pump. The new barge is the fourth unit of the fleet. It will operate from Portland to Umatilla. The other units of the fleet are the Inland Chief, unique wheat-oil carrier; a chartered barge of 218,000 gallons capacity; and a new Standard Oil barge of 200,000 gallons capacity.

An interesting development in upper Columbia River towboating is the fact that a third and similar Enterprise engine is also being installed in the above company's tug Mystic, a 65-ft. wooden hull originally designed and built with a 100-H.P. engine. In her short life, her power has been increased by ten through the medium of modern high-output diesel engines.



(Foreground) Typical shaper tool tipped with Kennametal grade KS. (Background) Machining steel with a Kennametal-tipped shaper tool.

Tools for Hardened Steel

McKenna Metals Co. announces the development of standard steel-cutting shaper tools tipped with Kennametal grade KS, for use on shapers and planers to machine steel of hardnesses up to 550 Brinell.

Unusual tool angles are employed, namely: 10° negative back rake, 5° negative side rake, 15° side cutting edge angle and 2° clearances. These tool angles, which must be maintained when regrinding tools for the best results, are made possible by the low frictional resistance between Kennametal and the work being cut. As a result, less frictional heat is developed than when high-speed steel tools with conventional high side rake angles are used. This is demonstrated by the fact that chips from Kennametal shaper tools are straw colored, while those from high-speed steel tools are a deep blue—using the same speed, feed and depth of cut in both instances.

Kennametal shaper tools will shape steel of hardness above the machinable limit for high-speed steel tools at speeds that are often double those used with high-speed steel tools on work in the lower hardness ranges. Die blocks of 42 Rockwell C hardness may be hardened before machining with Kennametal, saving the grinding operation that would be necessary if they were hardened after shaping.

Kennametal KS has a hardness of 76 Rockwell C, but has a strength unequalled by any other hard carbide tool material, namely, 322,000 lbs. per sq. in.

Problems Answered

(Continued from page 36)

Describe, discuss:

Instructions regarding little-used machinery.
Instructions on fire in machinery spaces.
Duties under emergencies at sea.
Work list and maintenance schedule.
Inflammable and combustible liquid cargoes.
Evaporator system on passenger vessel.
The typical general alarm system.
Welded repairs as regards General Rules.
Testing safety valves.

Chief

Describe, discuss:

Extension rods on suction valves in tanks.
Cofferdams.
Fire pumps for passenger vessels.
Producer's records regarding fuel oil.
Management of machinery and crew.
Electric-drive ship in crowded water.
Repairs in foreign port.
Minimum fire-extinguishing gas concentration.
Sanitation of crew's quarters.
Preparation for inspection by Bureau.
Minimum flash point for fuel oil.
Restrictions regarding fuel oil fittings.

Additional for chief. Sketching:

Draw side and end elevation and plan view of a pictorially-represented part of machine. Picture is furnished with the examination. Show: the part in place, dimensions; and materials.

Building in American Yards

Direct Reports from Yards as of January 1, 1940

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Contract dated September 18, 1939.

One pineapple barge 175′ x 45′ x 11′; 650 gross tons; for Young Brothers, Ltd., Honolulu, T. H. Contract dated October 4, 1939. Completion date March 10, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Alvarado, Dredge Holland, Ohio, Charlie Watson, Richlube, Lahaina, New Zealand, Limerick, Hauraki, Associated, Shabonee, Lurline, Stm. Sch. Elna.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 35-ton crane all-welded steel whirley derrick barge; 120′ x 44′ x 9′; for U. S. Engineers, Bonneville, Ore. Keel laid June 5, 1939; launched September 16, 1939.

One twin screw tunnel all-welded stern towboat; 2500 H.P.; 93′ x 25′ x 6′. Keel laid October 2, 1939; launched November 11, 1939.

One 200,000-gal. capacity all-welded oil barge; 144′ x 35′ x 8′. Keel laid October 16, 1939; launching date December 22, 1939.

One 15-ton whirley derrick barge, all-welded; 93′ x 40′ x 6′. Keel laid November 25, 1939; **launching date January 30, 1940.**

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission.

FELLOWS & STEWART, INC.
Wilmington, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Yachts Navigator, Astrild, K'Thanga **and Joyita; Tug Jimmie K.; N. B. Scofield; 53 smaller yachts and commercial vessels.**

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Fifth Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Purse Seiners St. Mary, Morning Star, Star of Monterey, Western Spirit, Santa Rita, Western Clipper, Western Monarch and Eneas; Lightship No. 83; Cutter Golden Gate; Tug Morton S. Tower; Oil S. Midway; S. S. Tahoe, W. R. Chamberlin, Jr., Davenport, Idaho, Oregon, Svea, Stanwood and Lumberman.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION

Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Launching date, December 10, 1939; **delivery date, February 15, 1940.**

DRYDOCK AND ROUTINE REPAIRS:

Remodeling 105-ft. hull for purse seiner, and installing 380-H.P. Union diesel engine and complete purse seine equipment.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Sts.
Seattle, Wash.

NEW CONSTRUCTION:

One stern wheel steam snagboat, Preston, for U. S. Engineer Dept. **Delivered January 8, 1940.**

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Launching date, October 14, 1939; estimated delivery date, March 9, 1940.

4750-bbl. steel oil barge for Standard Oil Co. of Calif.

DRYDOCK AND ROUTINE REPAIRS:

Ferries Leschi and Lincoln.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS.

Yacht Melodie, Torres, Thorshavn, Brattdal, President Coolidge, Trevolgan, Eidsvold, Californian, Missourian, Minnesotan, Pennsylvanian, Columbian, Montanan, American, Delawarean, Kansan, Alabaman, Georgian, Kentuckian, Illinoian, Virginian, Dakotan, Alaskan, Moveria, La Brea, Manoa, Tidewater-Assoc. Oil Barge No. 6, Korshamn, Helgoy, Oregon Express, Kentucky, Sonora.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Covered lighter (YF-259); keel laid November 29, 1939.

Order received for construction of two fuel oil barges (Y044 and Y045), dated July 11, 1939.

DRYDOCK AND ROUTINE REPAIRS

Concord, Indianapolis, McFarland, Williams, Wells, Cushing, Perkins, Preston, Smith, Sepulga, Tippecanoe, Kalmia, Sonoma, Cimmaron, Salmon, Snapper.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; launched September 15, 1939. No 196, keel laid September 19, 1939; launching date December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission.

DRYDOCK AND ROUTINE REPAIRS

Hidalgo, Louisianan, O. A. Brodin, R. J. Hanna, Capt. A. F. Lucas, Delawarean, Californian, Wallingford; Purse Seiners Lina B and Santa Lucia; Albatross, Mary M., Berg, Isleton, Salawati, New Ambassador, Thor I, Willmoto, Honolulan, Humaconna, James Griffith, San Joaquin, Boschfontein, Silverado, Komoku, H. T. Harper, Storm, Korshamn, Disa, Yankee Clipper, United, North Star, Haviside Barge No. 3, Torvanger, Farallon, Genevieve H2, Sunde, Chicago, Pacific Fisher, Marmex.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138); keel laid September 23, 1939; launched November 6, 1939.

Ala (YT139); keel laid September 23, 1939; launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:

Breese, Brooklyn, Idaho, Mississippi, Patoka, Saratoga, Wilson, Yorktown.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Kahuku, Tug Arthur Foss, Oduna, Charcas, Charles L. Wheeler, Andrea F. Luckenbach, Sidney M. Hauptman, Tug Tyee, James Griffiths, Hoyanger.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, purse seine fishing vessel; keel laid November 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

One relay barge 104′ x 34′ x 8′ for the Panama Canal. **Delivery date January 1, 1940.**

Six oil barges 195′ x 35′ x 10′ for Socony-Vacuum Oil Co.

Six coal barges 175′ x 26′ x 11′ for stock.

Twenty coal barges 175′ x 26′ x 11′ for Carnegie-Illinois Steel Co.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates June and August, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S Government, keel laid April 1, 1936; launched April 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; No. 1470 launched November 15, 1939; delivery dates March, 1940 and May, 1940.

Hulls Nos. 1475, 1476 and 1477, three freight vessels for American Export Lines, Inc.: 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1475, December 16, 1938; No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching dates, No. 1475, September 16, 1939; No. 1476, December 28, 1939. **No. 1475 delivered November 16, 1939.**

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

Hulls Nos. 1481-1484, four freight vessels; 450′ BP. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938; launched September 9, 1939. No. 4331, keel laid September 18, 1939.

Hulls Nos. 4337, Delbrasil; No. 4338, Deltargentino; and No. 4339, Delorleans; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. Launching date, No. 4337, December 16, 1939. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, Victor H. Kelly, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939, **launched January 6, 1940.**

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8001, Navajo; 8002, Seminole; and 8003, Cherokee—three U. S. Navy fleet tugs. No. 8001, keel laying date December 12, 1938; launched August 17, 1939; **delivery date January 22, 1940.** No. 8002, keel laying date December 16, 1938; launched September 15, 1939; delivery date March 1, 1940. No. 8003, keel laying date December 23, 1938; launching date November 10, 1939; delivery date May 1, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Keel laying dates March 1, April 1, July 1, October 15 and December 15, 1940, respectively. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100′ x 25′ x 12′; 805 H.P. Fairbanks-Morse engine. Delivery date May 1, 1940.

Two wooden deck scows 118′ x 36′ x 10′ for builder's account. Delivery dates March and May, 1940.

Two steel tugs 90′ x 23′ x 10′; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery date 1940.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Diesel driven; 170′ x 21′ 6″. General Motors engines; steel construction. Delivery date June, 1940.

Hull No. 167, sub-chaser PC-452, length 174′, for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Huls Nos. 1570-1572, three welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 750 gross tons.

Hulls Nos. 1606-1608, three welded covered cargo barges 175′ x 26′ x 11′; 1590 gross tons.

Hulls Nos. 1623-1628, six welded steel coal barges 134′ x 34′ x 17′ for stock; 4602 gross tons.

Hull No. 1650, one welded steel coal barge 170′ x 40′ x 17′ for Oliver Transportation Co., Philadelphia, Pa.; 1100 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1653-1656, four welded steel carfloats 330′ x 40′ x 11′ for Long Island RR, Philadelphia, Pa.; 5212 gross tons.

Hulls Nos. 1657-1658, two steel barges 50′ x 20′ x 5′ for War Department, Corps of Engineers, Office of Chief of Eng., Washington, D. C.; 76 gross tons.

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hulls Nos. 1665-1673, nine welded steel coal barges 210′ x 26′ x 11′ for Wheeling Steel Corp., Wheeling, W. Va.; 5094 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135′ x 26′ x 8′ for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hulls Nos. 1675-1677, three welded covered cargo barges 175′ x 26′ x 11′ for Mountain City Mill Co.; 1590 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hulls Nos. 1683-1688, six type W-7 welded coal barges 175′ x 26′ x 11′ for stock; 2832 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80′ x 30′ x 9′ for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250' x 34' x 9' 1" for Pennsylvania R.R.; 5940 gross tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hulls Nos. 158, Flying Fish; and 159, Comet; two C-2 cargo vessels for U. S. Maritime Commission. Keels laid May 26, 1939; launching date, December 16, 1939.

Hulls Nos. 160 and 161, two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939.

Hulls Nos. 162-167, six C-3 cargo vessels for U. S. Maritime Commission. Keels laid, No. 162, May 8, 1939; No. 163, July 24, 1939; No. 164, October 9, 1939; No. 165, November 13, 1939. **Launching date, No. 162, January 27, 1940.**

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Contract date March, 1939; completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels. Contract date September, 1939.

Hull No. 271, ferryboat for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.; 105' x 35' x 5'. Completion date March 1, 1940.

Hulls Nos. 272 and 273, two flat deck barges for West Virginia Pulp & Paper Co., N. Y., N. Y.; 105' x 32' x 7'. Completion date March 1, 1940.

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147' x 35' x 7' 6". Estimated completion date, August 1, 1940.

Hulls Nos. 275-276, two oil barges, 93' x 36' x 10' 6", for Panama Canal, Washington, D. C. Estimated completion date, May 11, 1940.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80', beam OA 22' 7", depth 9' 6". Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. **Delivery date January, 1940.**

One all welded diesel electric automobile and passenger ferry 185' 2½" LOA x 55' beam over guards x 15' 6" deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. **Delivery date January 1, 1940.**

One all-welded twin screw **automobile and passenger ferry;** 132' LOA, 43' 8½" beam and 10' deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines.

Four all-welded unmanned barges 173' x 39' x 8' 6" for Pan American Refining Co. Delivery date, spring, 1940.

One steel single-screw diesel tugboat 70' x 19' x 8' for Pan American Refining Co.; 450 B.H.P. Delivery date, March, 1940.

One electric ferry 185' 2½" x 55' x 15' 6" for Electric Ferries, Inc. Powered with 950-H.P. General Motors diesel with one 750-H.P. propelling motor. Delivery date, April, 1940.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406' x 57' x 23.5'.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

Laura Mansk, Bohemian Club, Dredge Rossell.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Keel laid August 22, 1938; launching date, August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939; **No. 372, February, 1940.** No. 370 launched September 29, 1939.

Hulls Nos. 375 and 376, two single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 8000 tons; length 435', breadth 63', depth 40' 6". Keels laid, No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 375, October 18, 1939; No. 376, December 15, 1939.

Hull No. 378, battleship, 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid, No. 379, October 2, 1939; No. 380, November 3, 1939; No. 381, December 26, 1939.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938; launched D cember 9, 1939.

One seaplane tender for U. S. Navy; o der placed October 14, 1938.

One battleship for U. S. Navy; ord placed December 1, 1938. Keel laid Jul 1939.

One repair ship for U. S. Navy; ord placed July 20, 1939.

PORTSMOUTH, N. H., NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Ti ton, Trout, Marlin, Grayling and Grenadie

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THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passeng ferry for Virginia Ferry Corp; 1600 gr tons; 300' x 65' x 20'; steam UnaFlow pr pulsion; 3600 H.P.; 16-knots speed; co $1,000,000. Delivery date November, 194

Hulls Nos. 1075 and 1076, two C-1 carg vessels for U. S. Maritime Commission; 500 gross tons; 413' x 60' x 37' 6"; turbine pro pulsion; 4000 H.P.; 14-knots speed; co $1,928,000. Delivery dates January an March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs f Donaldson Towing & Lighterage Co.; 20 gross tons; 95' 6" x 24' x 14' 9"; steam Un Flow propulsion; 600 H.P.; 13-knots spee cost $200,000. Delivery dates July and A gust, 1940, respectively.

SUN SHIPBUILDING AND DRY DOC COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 182-185, four single-screw di sel cargo vessels for U. S. Maritime Commi sion, C-3 design. Equipped with Busch Su zer engines. **Delivery dates, January 15, Fe ruary 15,** March 10 and April 15, 1940, r spectively.

Hulls Nos. 186-189, four C-3 single scre combination passenger and cargo vessel diesel propelled; equipped with Sun-Doxfo engines. Delivery dates October 6, 194 December 5, 1940; February 3, 1941, an April 4, 1941.

Hull No. 190, one 16-knot tanker f Texas Co.; single screw steam turbine; 13,2 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single scre steam turbine railroad car carriers for Se train Lines, Inc. Keels laid July 28 and Au ust 17, 1939; delivery dates April 15, 194 and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type carg vessels for U. S. Maritime Commission; 45 x 63' x 31' 6"; 9291 dwt. tons; diesel po ered. **Launching dates,** No. 33, October 3 1939; **No. 34, January 10, 1940.**

Hulls Nos. 37-40, four C-2 type carg vessels for U. S. Maritime Commission; 45 x 63' x 31' 6"; 9291 dwt. tons.

More About the Puerto Rico Club

(Continued from Page 53)

ment of shipping services to this island will undoubtedly assist in more quickly obtaining those things which are needed," the Governor stated. "The excellent climate of the island, the advantages which derive from existance under the American flag, and the present all-important fact that travel between the continent and Puerto Rico in American ships is safe, should offer great inducements for travel here in the future. A Propeller Club at San Juan will be able to take a leading part in seeking the additional expansion and development of necessary shipping services to Puerto Rico for the benefits of trade and to induce larger numbers of travelers to visit and enjoy our lovely island."

Due to its strategic position Puerto Rico has recently become the spearhead for the United States and Caribbean defenses and much government activity is under way. With larger increases in the Army, Navy and Air forces as well as other government departments, travel has already been stimulated by families of these forces and such is bound to increase materially. Uncle Sam has launched a $30,000,000 defense program for Puerto Rico, antechamber to the Panama Canal, link between North and South America.

An invitation was extended to Honorary President Arthur M. Tode of The Propeller Club of the United States to come to Puerto Rico to assist in organization work. Mr. Tode reached San Juan from Ciudad Trujillo, Dominican Republic and conferred with a committee appointed for this purpose. Finally, at a luncheon tendered to Mr. Tode at the Palace Hotel, San Juan, on January 2nd, there were gathered fifty of the ranking officials of the Navy, the Army, the Coast Guard and shipping companies who held the first meeting of the club, received their Charter as Port No. 72 from National Headquarters, adopted Constitution and by-laws, elected officers and a Board of Governors, accepted their club banner amid much enthusiasm and formally launched the Propeller Club, Port of San Juan, P. R.

Officers

President, Mr. Manuel G. Casseres, Manager, Porto Rico Line.

Vice-president, Mr. E. Larroca, Manager, Lykes Bros. Steamship Co., Inc.

Secretary, Mr. W. L. Swain, Executive Assistant, Porto Rico Line.

Treasurer, Mr. E. G. Lassus, Assistant Treasurer, McCormick Steamship Co.

Board of Governors

Three-Year Term (Expiring 1943) —Mr. Manuel G. Casseres, Manager, Porto Rico Line; Mr. Arturo Geigel, Manager, McCormick Steamship Co.; Mr. E. Larroca, Manager, Lykes Bros. Steamship Co., and Mr. Miguel Such, Vice-president, Bull Insular Line.

Two-Year Term (Expiring 1942) —Mr. John Bradley, Manager, Behn Brothers; Mr. Carlos Ball, Vice-president, San Juan Mercantile Co.; Capt. Francis B. Crocco, Supt. of Terminals, Porto Rico Line, and Mr. C. R. Hartzell, Attorney, Hartzell, Kelley & Hartzell.

One-Year Term (Expiring 1941) —Mr. A. Lugo Vina, Manager, Waterman Steamship Corp.; Comdr. W. F. Towle, U.S.C.G., U. S. Coast Guard, Comdg. San Juan Dist.; Mr. W. J. Truss, Associate Engineer, U. S. Engineers Office, and Mr. F. Vidal, Partner, Sucs. de Abarca.

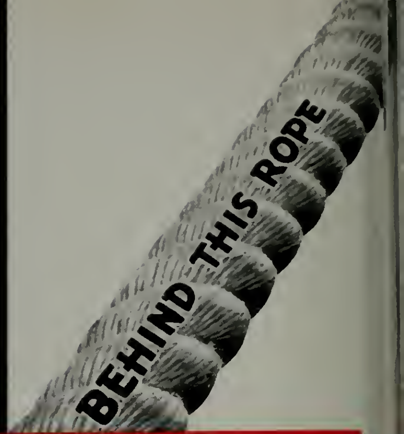
Honorary Members — Governor William D. Leahy of Puerto Rico, Rear Admiral, U.S.N., Rtd.; Brigadier General E. L. Daley, U.S.A., Commanding Puerto Rican Department, and Rear Admiral Raymond Ames Spruance, U.S.N., Commandant, 10th Naval District.

Among those attending the Charter Members' meeting of The Propeller Club of the United States, Port of San Juan, P. R., on January 2, 1940, were:

Carlos Ball, Vice-president, San Juan Mercantile Co.; Captain W. H. Barton, Superintendent, U. S. Lighthouse Service; James R. Beverly, Attorney and Ex-Governor of Puerto Rico; John Bradley, Manager, Behn Brothers; Victor Braegger, Insurance Representative; Pedro J. Bras, Vice-president, Porto Rican Express Co.; Lieut. R. C. Brown, U.S.N., Hydrographic Office; Manuel G. Casseres, Manager, Porto Rican Line; E. Combes Guerra, El Mundo; Walter Cope, Secretary to the Governor; U. Cordova, Manager, Cia. Popular di Transportacion; Captain F. B. Crocco, Terminal Supt., Porto Rico Line; Lieut. Comdr. E. A. Cruise, U. S. Navy; Brig. Gen. E. L. Daley, U.S.A., Commanding Puerto Rican Department; Lieut. K. O. Ekelund, U.S.N., U. S. Naval Radio Station; R. Garcia Moreno, Asst. Manager, Lykes Bros. S. S. Co; Arturo Geigel, Manager, McCormick Stemship Co.; Fernando Gonzales, Assistant Secy., Behn Brothers; Juan C. Gonzales, Commercial Agt., American Railroad Co.; Dr. R. W. Gray, Director, U. S. Weather Bureau; Lt. Comdr. L. B. Green, U.S.N., Naval Headquarters; Ignacio Guasp, President, La Gaceta Maritima; H. M. Hanbury, Manager, The Texas Company; Charles R. Hartzell, Attorney, Hartzell, Kelley & Hartzell; Capt. Nels Helgesen, Master, S. S. Coamo, Porto Rico Line; George Holliday, Chamber of Commerce of Puerto Rico; Capt. John B. Hunziker, Bureau of Marine Inspection & Navigation; Major J. F. C. Hyde, U.S.A., Headquarters, Puerto Rican Department; Capt. W. J. Kennerly, Manager, Puerto Rican Coal Company; E. Larroca, Manager, Lykes Bros. Steamship Co.; E. G. Lassus, Asst. Treasurer, McCormick Steamship Co.; Waldemar Lee ,Vice-president, Albert Lee & Son; A. Lugo Vina, Manager, Waterman Steamship Corporation; William Munch, Representative Board of Underwriters; Felix E. Muniz, President, West Indies Advertising Co.; Ramon Nadal, General Agent, Porto Rico Line; Harry Partridge, Special Rep., Porto Rico Line; Lieut. Cormdr. K. W. Perry, U. S. Coast Guard; E. R. Pons, Bull Insular Lines, Inc.; J. Saldana, Secretary, Albert Lee & Son; Miguel Such, Vice-president, Bull Insular Lines, Inc.; W. L. Swain, Executive Asst., Porto Rico Line; H. G. Thompson, Bureau of Marine Inspection & Navigation; W. J. Truss, Associate Engr., U. S. Engineers Office; F. Vidal, President, Sucs. de Abarca; G. S. Warner, Manager, West India Oil Company; Lt. Comdr. L. Wishrad, U.S.N., Naval Aide to the Governor, and A. Valencia, Traffic Manager, Bull Insular Lines, Inc.

PACIFIC MARINE REVIEW

MARCH, 1940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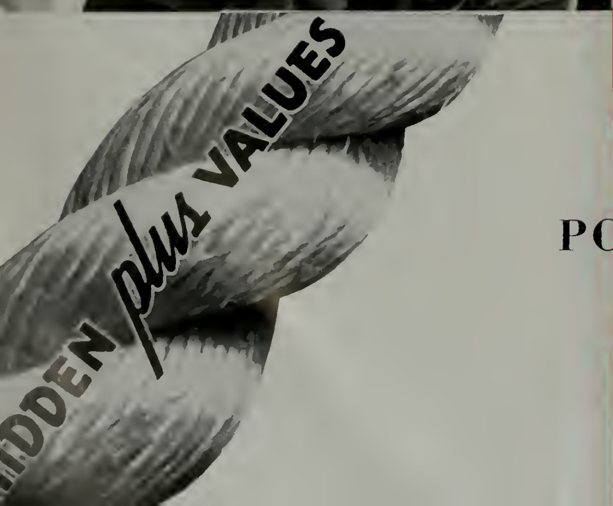
HIDDEN plus VALUES

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

Contents - March, 1940

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COMPLETE FACILITIES
FOR THE REPAIRS OF
VESSELS AND THEIR
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PACIFIC MARINE REVIEW

MARCH
1940

The New San Francisco-Orient Liners

On February 13 the U. S. Maritime Commission issued plans and specifications to American shipbuilders for a pair of ships that, when built, will be the largest merchant vessels ever constructed in an American shipyard. The fact that these two vessels will be allocated to the transpacific services of the American President Lines, and that their home port will be San Francisco, should stir the imagination and the pride of every marine-minded citizen on the Pacific Coast.

These vessels will be unique in many ways.

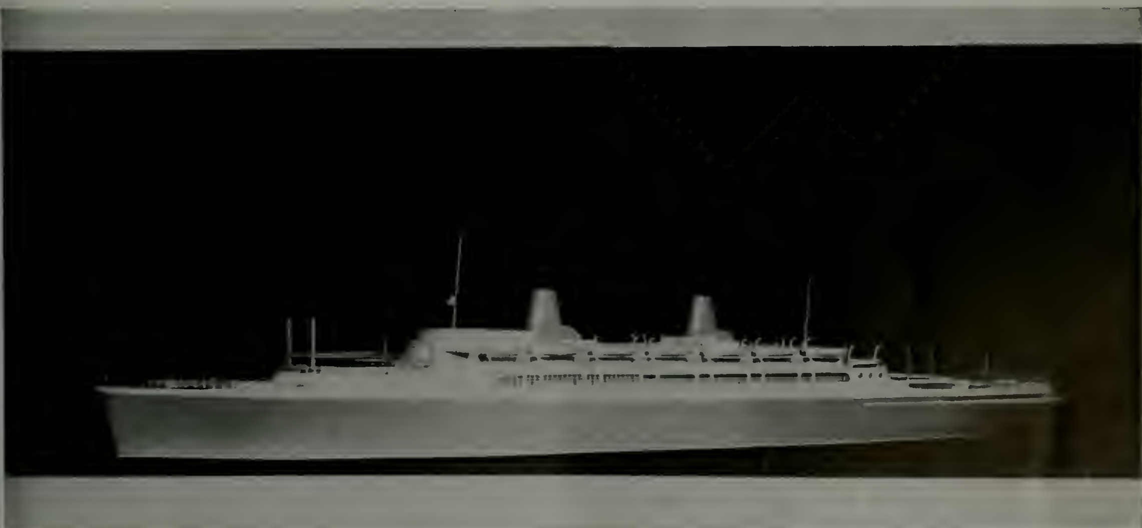
With a sustained sea speed of 24 knots, they will be the fastest large merchant vessels in the American Merchant Marine.

With funnels rising on the starboard side instead of amidships, these vessels will be the first American merchant ships designed for quick change to Navy airplane carriers in time of emergency.

With a turtleback fo'cas'le and a fully-streamlined long bridge erection, their profile somewhat resembles that of the French liner Normandie, again first in America.

With a degree of subdivision greater than any liner afloat, and a provision of accident preventive and emergency equipment far in excess of all rules, regulations, or even Senate resolutions, they should be the safest ships afloat.

The cost of each as estimated by the Commission will be around $22,000,000, which, in addition to all the other features mentioned, should cover a high degree of



Scale Model of P.-4 Trans-Pacific Passenger Liner.

luxurious comfort for her 1,000 passengers and 500 officers and crew.

We can confidently assert, therefore, that these two vessels, now known simply as the U. S. Maritime Commission P-4 design, will be the largest, fastest, safest and most luxurious passenger liners flying the American flag on any ocean or flying any flag in regular service on the Pacific Ocean.

There are in the United States at the present time only three shipyards ready to construct these vessels: Bethlehem Fore River Yard; Newport News Yard, in Virginia; and New York Shipbuilding Co., in New Jersey.

If the next generation of progress in Pacific Coast shipyards matches the last generation of progress in Pacific Coast ship operation, we ought to be building the successors of these ships at a Pacific Coast yard in 1960.

> FOR A NAVIGATING PEOPLE *to purchase its marine afloat would be a strange speculation. Placing as a reserve with a foreign nation, or in a foreign shipyard, the carpenters, blacksmiths, caulkers, sailmakers, and the vessels of a nation, would be a singular commercial combination. We must, therefore, build them for ourselves . . .* THOMAS JEFFERSON.

The Marine Engineer and His Educational Problem

The past 10 years have witnessed tremendous development in the marine power plant. Propulsion machinery, both in steam and oil engine drives, has developed very rapidly to meet the demand for higher speed of the ship.

Steam pressures and temperatures have doubled in normal units, and in some cases pressures have been multiplied by six. The trend is still decidedly upward.

The diesel engine has become more standardized and, through refinement of design, less costly, lighter in weight, and more economical in fuel.

Desire for rapid turn around, demands for crew comfort, safety regulations and modern methods of caring for cargo have greatly multiplied the auxiliary power applications, even in simple cargo vessels.

The marine engineer today finds himself shipmates with a highly-complicated mechanical and electrical organism, which he must control intelligently in order to have the ship function efficiently as a transportation unit.

Recognizing these new elements in the marine power plant, the U. S. Bureau of Marine Inspection and Navigation has thoroughly revised its procedure and the content of its tests to determine fitness of licensed engineer officers in the American Merchant Marine.

At the present time this new set-up, and all that it involves in security of job and of grade status, should be the paramount object of thought for every American marine engineer.

> IT IS NECESSARY *for many weighty reasons of national efficiency and development that we should have a great merchant marine. . . . It is high time we repaired our mistake and resumed our commercial independence on the sea.*—PRESIDENT WILSON.

Hunter's Point Dry Docks

Some time ago we printed an editorial protesting against the effort of the Navy Department to acquire the graving docks at Hunter's Point, San Francisco, then and now owned and operated by the Union Yard of the Shipbuilding Division of the Bethlehem Steel Company. Since that editorial was written, an arrangement has been made between Bethlehem Steel and the U. S. Navy Department whereby these docks will become the property of and will be operated by the U. S. Navy.

In making this arrangement, Bethlehem has been very careful to protect the interests of their customers, the commercial ship operators of the Pacific Coast.

The Union Plant still has complete control of operation of these docks, and from the time that the U. S. Navy has bought and paid for the docks, the Union Plant will retain control of operation for three years on the larger dock and for four years on the smaller dock. This will give Bethlehem ample time to build a new dock to take the place of the present facilities.

Graving docks on the Hunter's Point site have been serving San Francisco Bay shipping continuously since Ralston built a basin there in 1868. For the past 25 years this point has been the site of the largest commercial graving dock in the United States. By that statement we mean that the large dock at Hunter's Point was, when built in 1915, and is now, the largest commercial graving dock in the country.

Under the new arrangement, the U. S. Navy evidently is planning to make this Hunter's Point site into a first-class Navy repair and maintenance depot complete with all necessary shops, cranes, industrial trackage and administration offices. That will mean another pay roll for San Francisco, and for that we may be thankful.

In the meantime, Bethlehem expansion with a new dock, possibly in a more convenient location, will maintain and possibly increase the present San Francisco pay roll on ship repairs and maintenance.

American Foreign Trade in American Merchant Ships

A very old adage says that "Experience is the best teacher," but as Carlyle adds, "the school fees are often very high."

America's experience in foreign trade shipping bears out the truth of Carlyle's comment even more than that of the original adage.

We are periodically troubled about our overseas commerce, and particularly as to the proportion of that commerce which should be carried in American-flag ships.

At the 1939 Merchant Marine Conference, Col. A. B. Barber, of the Transportation and Communication Department of the United States Chamber of Commerce, presented an interesting analysis of this subject, from which we glean some very pertinent figures.

That during the 10 years from 1928 to 1938 the total tonnage of American overseas dry cargo, and the percentage of this total tonnage carried in American-flag services, ranged in round numbers as follows:

Year	*Thousand Tons*	*Per Cent*
1928	58,503	31
1929	61,320	32
1930	51,458	31
1931	40,711	31
1932	30,708	30
1933	32,530	31
1934	36,112	31
1935	39,783	29
1936	41,806	29
1937	54,044	29
1938	45,863	25

This table shows quite a fluctuation in total tonnage, but a remarkable constancy in the percentage figure until the sudden drop between 1937 and 1938. It leaves us with a drop of 6, or of 20 per cent in percentage carried, and a drop of 6,670,000 tons, or 31.5 per cent, in tonnage carried.

This certainly looks sufficiently serious, and indicates the necessity of maintaining and increasing the campaign of education to show the national advantage of giving business to American-flag shipping.

"For freight or trip
Use an American ship."

While the tanker traffic is mainly confined to the specialized trade in petroleum, and American tankers are largely owned and operated by American petroleum producers and refiners, still that trade in American-flag ships shows an even more drastic reduction. The comparable figures are:

Year	*Thousand Tons*	*Per Cent American*
1928	29,296	52
1929	31,444	51
1930	30,276	50
1931	24,617	45
1932	21,424	42
1933	18,220	36
1934	20,215	36
1935	21,092	38
1936	23,062	32
1937	28,926	22
1938	30,538	26

Here we note a falling of 26 in percentage carried, and a drop of seven million tons in weight carried. In percentage of loss to American-flag commerce, this figures 50 per cent and 47 per cent, respectively.

We do not yet have official figures to show the effect of the neutrality legislation on this picture, but undoubtedly it has accentuated these losses. In this connection it is interesting to note that in some of the trading areas not under the interdict of the neutrality act there is a very low per cent of American commerce carried in American-flag ships. Some of these, with their dry cargo tonnages, are:

Mediterranean and Black Sea area has annual trade with us of nearly 2½ million tons, of which we carried in 1938 only 22 per cent.

India, Persian Gulf, Red Sea, have a little over a million tons, of which we carry 24 per cent.

North China, Shanghai, Japan, have nearly 4 million tons American trade, of which American-flag ships get 5 per cent.

Atlantic Canadian coast has nearly 4 million tons, of which we carry only 5 per cent.

Our trade with the Caribbean Sea area is nearly 7 million tons, the great majority of which is under direct American control and management and financed by American capital. No neighboring nation involved maintains a merchant marine. This would seem to be a "natural" for American-flag shipping, and yet we get only 38 per cent. We should get 83 per cent.

Australia-United States trade is nearly a million tons, of which our ships carry only 17 per cent.

Straits Settlements and Dutch East Indies are credited with a million tons, and our vessels get 11 per cent.

These figures certainly indicate present opportunities for American-flag services to build up their cargo business. The facts point also to an obvious necessity for continued education of the American exporter and importer in the value of shipping via American-flag vessels.

They confirm the truth of the statement often made by leading ship operators that the best possible American subsidy for American-flag ships in overseas trade would be 100 per cent carriage of the American overseas cargoes.

A New Shipyard

ONE YEAR AFTER GROUND BREAKING THE INGALLS SHIPBUILDING CORPORATION HAVE SHIPYARD COMPLETED AND HAVE FOUR HULLS WELL UNDER WAY

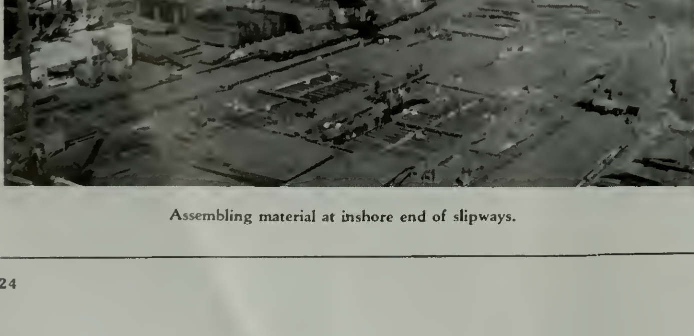
Thirty years ago, Robert I. Ingalls, then of Dayton, Ohio, went down to Birmingham and founded the Ingalls Iron Works Company, of which business he is today the head. His policy is one of continual expansion, and today the parent company has a number of fully-owned subsidiaries, including the Ingalls Steel Products Company, the Birmingham Tank Company, the Steel Construction Company, and latest, but by no means least, the Ingalls Shipbuilding Corporation. This combination of affiliates is said to be the largest independent fabricator of structural and plate steel in the United States.

The directing personnel of the Ingalls Shipbuilding Corporation includes:

Robert I. Ingalls, chairman of the board
Robert I. Ingalls, Jr., vice chairman
M. B. Lanier, president
W. R. Guest, vice president
A. J. Grassick, general manager
C. W. Zander, secretary and treasurer
A. C. Leigh, naval architect.

All of these men are by practical experience very familiar with the Ingalls fabrication and welding practique, and together they form an organization that is well adapted to achieve great results in welded ship construction.

For some years, the Ingalls Shipbuilding Corporation has been building welded steel barges, tugs and river craft in a well-equipped shipyard on the Tennessee River at Decatur, Alabama, and at its leased Chickasaw Yard in Mobile, Alabama. In 1938 Ingalls purchased 46 acres with 3,000 feet of water frontage in Pascagoula, county seat of Jackson County, Mississippi, and located on the mouth of the Pascagoula River. In January, 1939, all of the equipment at the Chickasaw Yard was moved to this new site. Here the technical staff of the Ingalls Shipbuilding Corporation laid out a shipyard especially adapted for all-welded assembly of large hulls, and designed to take fullest advantage of the very extensive fabricating facilities of the parent organization at Birmingham. The site is served by the Louisville and Nashville Railroad, which connects by special spur track to several miles of standard gage rail laid in the yard and to and into shops, warehouses and slips. Water transportation is available: by barge, direct to company's fabricating plants in either Birmingham or Pittsburgh; and by coastwise, intercoastal and ocean steamer to any port in the world.



Assembling material at inshore end of slipways.

The area was laid out: to give ample space for the convenient storage of fabricated material; to allow large areas adjacent to the building slips for the assembly of large portions of the hull as weldments; to

On the Gulf Coast

locate principal fabricating and shaping tools so that there would be an orderly progression of the work; and to position material-handling machinery and channels to the best possible advantage. The plan contemplates five shipbuilding ways, four of which have been built. These ways are of reinforced concrete construction built in a series of level platforms to a slope of ⅝ inches to the foot. The outboard launching ways are built out to a depth having 8 feet of water over the top of the ways at mean low tide. The river in front of the yard is dredged to 30-foot depth at mean low water.

The space available under the inshore end of these building ways is all utilized to provide: transformer and compressor stations; tool rooms; store rooms; offices for hull and machinery superintendents and for inspectors; showers; toilets; and locker rooms.

Three American Hoist and Derrick revolving type gantry cranes serve the slipways. Each of these cranes is carried on a steel tower 65 feet high (track to roller path). The four trucks at the bottom of this tower are thirty feet span center to center, and travel on rails of 20-feet gage. Two of these are power trucks, and each power truck is served by a 15-H.P. motor and by automatic electrically-operated brakes.

Each crane carries a 110-foot boom. The seven-part load line can pick up 35 tons at any radius up to 57 feet, and from there out its limit grades down to 13 tons at 95 feet radius. The whip line has a capacity for 6 tons at 100-foot radius.

The portal of each crane tower will permit passage of locomotive cranes and standard railroad equipment on the standard gage rails laid between the crane rails so that cars can be shunted alongside hulls under construction, and material spotted exactly where needed.

Inside the travel and boom radius of these cranes, and located across the inshore ends of the building ways, are large areas of flat plate platens for weldment assemblies of large size. Total area of these platens installed is 23,000 square feet, with ample room for expansion when necessary. The cranes can be operated in tandem with an equalizing bar, and can easily handle weldments of large volume and up to 75 tons in weight.

The mold loft building is two stories high, with mold loft on upper floor, and current plate and shape storage on the ground level served by a 15-ton bridge crane. Attached to this structure at right angles is the plate and angle fabricating shop. This houses an assembly platen 35 feet by 150 feet, and heavy machinery, including a trim shear, a gate shear, an angle shear and 30-foot plate rolls. Extensive tables are provided for automatic and manual flame cutting.

At right angles to the fabricating shop, and connecting with it and the mold loft, is the forge shop, 100 feet square. This contains bending slabs 50 feet square served by two oil-fired furnaces, one of which handles angles up to 50 feet, and the other takes plates up to 10 feet wide and 35 feet long. Alongside this bending slab is a 500-ton hydraulic plate bender that will handle plates up to 25 feet long.

Electric power is brought in at 2,300 volts and reduced to 440 volts at the various power stations. A power house attached to the fabricating shop houses a 100-K.W. converter and an electric motor drive air compressor with a capacity for delivering 500 c.f.m. of 100 p.s.i. air. Two 850-c.f.m. air compressors are

Crane runway over storage yard for fabricated material.

housed under the inshore end of No. 3 ways. Both pneumatic and hydraulic pipe lines and electric power lines are installed throughout the shops and the yard, with outlets conveniently available wherever needed. All electric power is regulated by capacitors to give a high average power factor for good economy.

Parallel with the mold loft, and at the end of the fabricating shop, is a crane runway 77 feet wide and 625 feet long, served by two bridge cranes of 10-ton and 15-ton capacity. In this runway area, finished fabrications and weldments are stored ready to go to the hulls on the ways. At one end is a welding platen 72 feet square for the assembly of weldments up to 18 tons weight. In this area a shape squeezer and a plate joggler are installed.

Completely equipped with modern electrically-operated wood working machinery, the carpenter shop is 50 feet wide by 180 feet long.

A fireproof building 50 feet wide and 204 feet long, located adjacent to building ways and outfitting dock, houses machine, sheet metal and pipe shops, in which modern tools best adapted to shipyard work in these crafts are now being installed.

Another fireproof structure 70 feet long by 30 feet wide is provided for the paint department.

For the outfitting basin, an area 1,400 feet long and 200 feet wide is being dredged to 22 feet depth at mean low water. Two ten-ton electric derrick cranes and a fifty-ton stiff-legged derrick will serve this outfitting dock. The fifty-ton derrick is mounted on a steel tower with its platform 65 feet above mean low water.

Most of this yard is less than a year old. Ground was broken on the project on February 20, 1939. The mold loft was open for operations on May 12, 1939. The first carload of templates was shipped to Birmingham on June 30, and the entire group of buildings for fabrication was ready for full operation on July 10. On August 14 keels were laid for two vessels. One week later another keel was laid, and on December 26 a fourth keel. Rapid progress is being made on these hulls, and it is expected that the first of these four vessels will be launched in April, and will be followed by the other three at approximately 30-day intervals.

The hulls of three C-3s rapidly taking form against the sky.

The vessels now building at the Pascagoula yard are of the C-3 type steam turbine propelled U. S. Maritime Commission cargo carriers. They are of 8,500 gross measurement tonnage, have 8,000 normal shaft horsepower and will travel at a sea speed of 16½ knots. They are to be named Sea Raven, Sea Robin, Sea Owl and Sea Swallow.

The Ingalls Shipbuilding Corporation has another contract from the U. S. Maritime Commission, calling for the construction of four C-3 passenger-cargo combination carriers to be allotted to the United States Lines.

A personnel department is maintained, and a welding school in charge of competent instructors. Promising local young men are given intensive training and enabled to become self-supporting. An apprenticeship system is in operation.

Cleanliness is maintained by a very strict enforcement of the rule that all paper and debris and empty soft drink bottles must be deposited in receptacles provided for that purpose. Modern sanitary facilities are provided in various parts of the plant, and are kept immaculately clean. Cooled drinking water is available, and is distributed to the workmen on the ships. No smoking during working hours is the rule.

Safety regulations are rigidly enforced. First aid is in charge of an experienced attendant and modern equipment is at all times ready for the treatment of minor injuries. On the ships and in the yard the premises and the work in progress are kept clean at all times, and so many of the hazards responsible for industrial accidents are eliminated.

Battery of individual welding machines on the deck of the Sea Raven.

Pacific

Northwest Marine Review

Keel laying of the first of the five new Maritime Commission twin-screw diesel ships will take place at the Seattle-Tacoma Shipbuilding plant at Tacoma on March 5. Meanwhile, work on the new yard is rapidly approaching completion, with two full shifts at work from 8 a. m. till midnight putting the finishing touches on the new plant.

Silk from Japan is again moving via Seattle, due to the special raw silk rail rate of $2 per 100 lbs., a sharp reduction from the former $3.30 rate based on a valuation of $1 per pound. A 4,000-bale shipment was brought in during February for transshipment at Seattle and Vancouver, B. C., for rail haul to New York. The new rate is based on a valuation of 50 cents per 100 lbs., and the silk moves on freight trains instead of passenger trains.

The Foss Tug & Barge Co. of Tacoma is completing a modern new tug at its own shipyard. This boat will have a 450-700-H.P. supercharged Enterprise diesel engine for power. Delivery is slated for April.

Commercial Iron Works, Portland, were successful bidders on the alteration of the U. S. Army Engineers dredge Mackenzie on a bid of $192,661 and completion time 98 days. Todd Seattle Dry Docks bid $208,064 on a completion time of 60 days.

Largest purse seiner. A 100-foot purse seiner fishing boat is now completing at the plant of Western Boat Building Co., Tacoma. She will be ready for May delivery, and will carry a 600-H.P. diesel engine.

Above, the rebuilt diesel-propelled tanker Dispatch at the outfitting dock of the Winslow Marine Railway and Shipbuilding Co., Winslow, Bainbridge Island, Washington.

Below, the U. S. Coast and Geodetic Survey steamer Explorer doing 14 knots during her trials on Lake Washington off the yard of her builders, the Lake Washington Shipyards, Houghton, Wash. This steamer is the latest word on survey ships. Built at a cost of a million dollars, she is equipped with a De Laval geared steam turbine propulsion unit.

Dispatch rebuilt. After an extensive rebuilding program carried out at the yards of the Winslow Marine Railway & Shipbuilding Co. at Winslow, on Bainbridge Island, Puget Sound, the steel tanker Dispatch will shortly be in service to upper Puget Sound ports.

This newly-rebuilt tanker was formerly the M. A. Powers, operating out of Boston. She is 140 feet long by 31 feet beam, with a depth of 10 feet, and measures 469 gross tons. She is now owned by the Petroleum Navigation Co. of Seattle.

New tanks, mast, pilot house, rigging and rudders, and a full electric drive for the pumps, have been installed at a total cost of over $90,000.

A new 110-H.P. Cooper Bessemer diesel engine generating set supplies power for the auxiliary set-up. For propulsion power, she has two 165-H.P. Cooper Bessemer diesels.

PRESENT STATUS

American Merchant Shipbuilding

by J. LEWIS LUCKENBACH

President, American Bureau of Shipping

Shipbuilding has been augmented during the past year through the continued activity of the Maritime Commission and the demands for special and tanker type tonnage. While 28 vessels (of 2,000 gross tons and over) with a total tonnage of 239,958 gross tons, which included three tankers taken over by the Navy, have been delivered during 1939, completed construction for the year 1940 will show a distinct increase, and we may expect about 52 seagoing ships of 470,500 gross tons, or practically double, in addition to the usual number of small craft to be delivered. Improvement is being made through the more general use of welding, and at least ten all-welded ships of the larger types may be expected to be delivered during the next year, while increased welding and a lesser amount of riveting will be typical for all.

Many of the ships now under construction are being built in yards that are equipped only for construction by electric welding, and these will be completely-welded ships. We have had large tankers for some time which were welded to a considerable degree and where all the major strength members were welded. The latest large and completely-welded tanker is the E. J. Henry, 521 feet long by 7 feet beam and 40 feet deep, in which welding was used exclusively. The Bureau is lending its support to the continuation of experimental research being conducted for the advancement of this art, which has already shown a possible saving in hull weight up to 20 per cent.

Intercoastal Program

A year ago I mentioned that no new construction was under way or seriously contemplated for the intercoastal or coastwise trade. This situation has not changed. The average age of vessels in the intercoastal trades was then about 20 years, and now they are a year older. Prices of our old tonnage have increased, and it is to be hoped that they will soon reach sufficiently attractive figures so that owners will find it expedient to dispose of this tonnage and replace it with that which is modern and efficient.

Marine Engineering

The advances in marine engineering continue to show marked improvement in fuel economy. Reciprocating engines and Scotch boilers with steam pressures around 200 pounds have faded from the picture in this country, virtually no new construction with this type of machinery having been built in the last decade. The most important place where such machinery still retains its popularity is in the larger ships of the Great Lakes, where, due to the peculiarity and intermittency of the service, it still meets with favor, although the last four vessels constructed on the Lakes some two

The C-2 cargo motorship Donald McKay, one of six sisters built by Sun Shipbuilding and Dry Dock Co. for the Maritime Commission and the Moore-McCormack Lines.

National defense-features fast tanker Seakay, one of 12 ordered by the Standard Oil Company of New Jersey in cooperation with U. S. Maritime Commission.

years ago were equipped with high-pressure water tube boilers and geared turbine machinery using superheat.

In our merchant ship construction, the trend has continued toward high pressures and higher superheat with the attendant higher total temperatures. This trend has resulted in vessels operating with 625 pounds pressure and total temperatures of 910 degrees, although this has been in association with electric drive, where turbine reversing problems do not exist. In the majority of ships now under construction where steam is being used as the motive power, pressures of 450 pounds are being specified, with total temperatures up to 800 degrees. However, contracts have been placed for two vessels designed for 1,500 pounds boiler pressure and 960 degrees total temperature.

Another application involves the reheating of the steam between stages for improved economy, and this principle is proposed for the new large passenger ships, contracts for which may shortly be placed. All these steps spell economy and advancement in the art, as machinery weights are thereby reduced and a reduction in fuel consumption gained as well as space saved. In addition, oil burning apparatus has been improved by the use of wide-range burners, giving more effective combustion control, and further development has taken place in the design of economizers for heat conservation. We are rapidly approaching a type of steam generator which will be operated directly in conjunction with the main engines with little or no steam storage but where steam is generated directly in accordance with requirements in which forced circulation will play an important part. Experiments along these lines have been going on both here and abroad, and a practical application may be expected to be made available for commercial use in the near future.

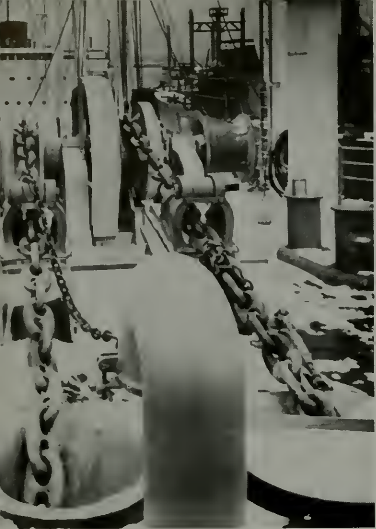
Economy Records

Surprising results have been achieved during the year. On the steam turbined Challenge a fuel economy of .545 pounds per horsepower hour was reached and it is claimed that these results can be bettered some 10 or 15 per cent in later installations now projected.

Internal combustion engines are being installed in many of the new Maritime Commission ships, the proportion being about one-third of the vessels under construction. Owing to the size of units necessary for single-screw propulsion, the use of a single propelling unit is being displaced by smaller multiple units of higher speed and efficiency operating through gears. Several methods of coupling are in use, such as the electric drive, where current is generated in diesel-driven generators supplying power to motors geared to the propelling shafting; and also geared drive, where the engines are connected to pinions through electric or hydraulic couplings.

It will continue to be interesting to watch the latest developments of these two types of propelling units, i.e., the internal combustion engine and the steam driven turbine, as each has an advantage from some particular standpoint. The Maritime Commission should be congratulated for sponsoring such forward steps in engineering, and it is the hope and expectation of all that the lessons to be learned will redound to the advantage of the shipowner.

Improvements in all types of auxiliary machinery, including cargo handling equipment, are being embodied in the vessels now under construction. Improved hatch closing devices are being installed, and crew accommodations little short of palatial are being provided, which should in the long run make for a better operated ship through a more satisfied personnel. It is worthy of comment that the ships now building are practically fireproof, every endeavor having been used to apply the latest developments in this field; also, that the highest practical degree of subdivision is being attained.



Forward deck, featuring American Engineering Co. windlass and die-lock chain cable.

America's Fastest Seagoing

Sun Shipbuilding and Dry Dock to Moore - McCormack With Geared

On January 18 the Sun Shipbuilding and Dry Dock Company delivered to the U. S. Maritime Commission the motorship Mormacpenn, which was immediately turned over to the Moore-McCormack Lines for operation in their New York-East Coast of South America service. This vessel proved on her trials to be the fastest cargo liner yet built in America, and is in many respects quite unusual.

She is to be followed by three sister ships from the same yard and for the same service. All of these have already been launched, and christened respectively Mormacyork, Mormacland and Mormacmail, so that they will probably be delivered at sixty-day intervals or less.

The hull of Mormacpenn is of the C-3 shelter deck cargo carrier Maritime Commission standard type, principal characteristics of which are given in table herewith. The hulls of this type have a raked stem, a cruiser stern and and a three-decked house amidships. Seven pairs of king posts support the cargo booms, the second and fifth pair each having a top crossbeam supporting a pole mast. These masts carry the running lights and signal halyards and support the radio antenna.

Cargo Handling Facilities

There are five main cargo holds in the hull of Mormacpenn, and five main hatchways in the shelter deck giving access to these holds. Dimensions of these hatchways are as follows:

No. 1—36′ 0″ x 20′ 0″
No. 2—30′ 0″ x 24′ 0″
No. 3—37′ 6″ x 24′ 0″
No. 4—30′ 0″ x 24′ 0″
No. 5—40′ 0″ x 24′ 0″

These hatchway openings on the shelter deck level are fitted with pontoon type steel covers supplied by Lukenweld, Inc. These covers require no strongbacks. They are arranged to roll off the hatchway lengthwise of the ship and nest in a compartment at the end of the hatch. Hatchways in all other decks are covered with the usual combination of strongbacks and hatch boards.

Twenty-one cargo booms are fitted. Sixteen of these are of 5-ton capacity, four will handle 10 tons each, and one is able to lift 30 tons. These booms are served by 20 American Engineering Company electric motor drive cargo winches. Each hatch, therefore, is served by four booms and four cargo winches. Deck erections between the king posts of each of pairs 2, 3 and 5 house resistor grids for the control of winch motors.

The arrangement of winches, fair leads and chocks is such that several winches can be concentrated on one large lift as needed. General Electric motors and controls are used on these winches.

All wire rope for rigging and mooring cables was supplied by the John A. Roebling Son Company.

M. S. Mormacpenn has a handsome, efficient appearance.

Cargo Liner

Company Delivers Lines the First of Four Vessels Diesel, Electric Coupling Drive

Above, an interesting view in the shaft alley. Below, two views looking forward and looking aft on the shelter deck.

Principal Characteristics

Length Overall	492′ - 0″
Length Between Perpendiculars	465′ - 0″
Beam Molded	69′ - 6″
Depth Molded to Shelter Deck	42′ - 6″
Depth Molded to 2nd Deck	33′ - 6″
Draft Loaded	28′ - 6″
Height 2nd to Shelter Deck	9′ - 0″
Height 3d to 2nd Deck	11′ - 9″
Displacement	17,600 tons
Weight of Ship and Machinery	5,865 tons
Total Deadweight Capacity	11,735 tons
Gross Measurement	7,680 tons
Propulsion Power Normal	8,500 S.H.P.
Continuous Power Available	9,350 S.H.P.
Emergency Maximum Power	10,625 S.H.P.
Speed on Trial	19 knots
Normal Sea Speed	16½ knots
Cruising Radius	14,500 miles
Passenger Capacity	12
Deep Tank Cargo Oil Capacity	2,050 tons
Cargo Cubic (Bale) Capacity	684,000 cu. ft.

In the way of holds Nos. 2 and 5, deep tanks for liquid cargo are installed with oil-tight hatches on the third deck level. In way of hold No. 4, approximately 35,000 cubic feet of refrigerated cargo space is fitted in the lower 'tween decks. All cargo holds and the engine room are protected against fire by a Rich smoke detecting system and a Lux carbon dioxide fire smothering system, both installed by the Walter Kidde Company of New York.

An American Engineering Co. hydro-electric gear directed by telemotor from the pilot house under either manual or Sperry Gyro-Pilot control takes care of steering.

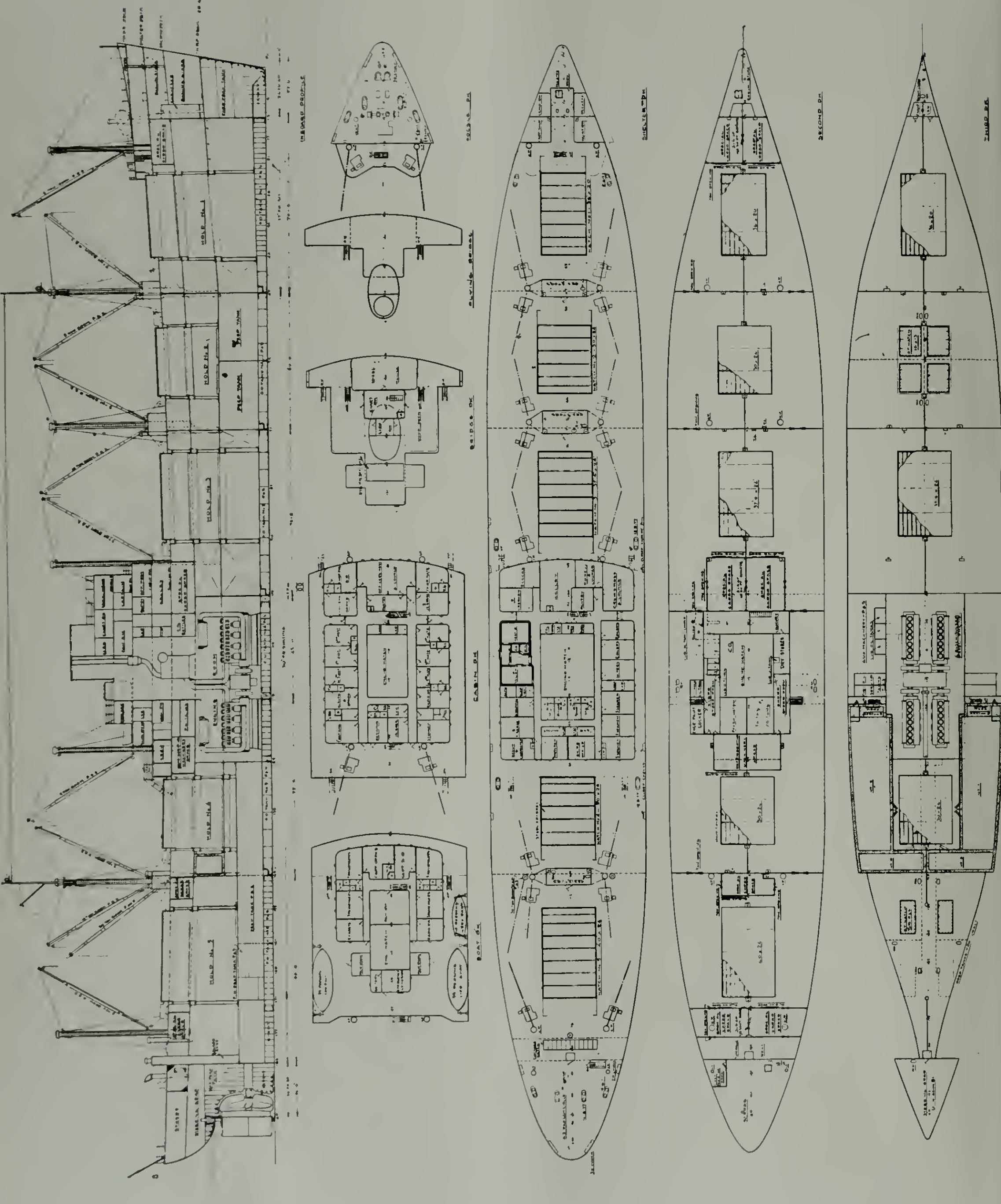
The refrigerating machinery was supplied by the Carrier Corporation, and is housed in its own compartment just aft of the engine room on the second deck level. Cooling is effected by a cold air circulating system and/or a direct brine coil system.

Mounted on the forecastle is an American Engineering Co. electric motor, spur gear drive, double windlass for handling the Baldt stockless anchors and the Baldt Die-Lock stud link chain cable.

Perhaps the most unusual feature of the Mormacpenn is her propulsion plant, which is the highest-powered geared diesel installed in an American ship, and the first American marine power plant to use electro-dynamic couplings between the prime movers and the gears. These features, combined with the record of the trial trip, proving her the fastest American cargo liner, give very special interest to this power plant, and we are glad to be able to give our readers a complete detailed description.

Propulsion Machinery

In the Mormacpenn and in each of her three sister ships the propelling machinery consists essentially of four diesel marine engines driving a single screw through electrical couplings and reduction gears. The rated power delivered to the screw is 8,500 S.H.P. at 85 r.p.m., with a continuous overload capacity of 10 per cent. The operation of all four engines and couplings is



Inboard profile and general arrangement deck plans.

controlled from a central station, simultaneously or selectively.

The engines are of Busch-Sulzer Diesel Engine Company's standard design and manufacture. The gear sets were designed and built by the Falk Corporation; the electrical couplings by the Westinghouse Electric & Mfg. Co.

The general arrangement of the propelling machinery is shown in drawings reproduced herewith. The total weight of same, up to the coupling attaching to the line shaft, is 1,050,000 pounds (470 tons), which is about 124 pounds per S.H.P. nominal rating, or 108 pounds per S.H.P. maximum continuous power. Of this weight, the engines constitute about 80 per cent.

Each engine is a two-cycle, trunk-piston, mechanical-injection, port scavenging and port-exhausting, air-starting, directly-reversible diesel with attached positive displacement scavenging blower.

The seven working cylinders of each engine are arranged in line. The bore of cylinders is 20½" and the stroke of pistons is 27½". The capacity of each engine on nominal rating is 2,225 B.H.P. at 240 r.p.m. Each engine must produce a continuous 10 per cent overload, or 2,450 B.H.P. at 247 r.p.m., and a 25 per cent overload, or 2,780 B.H.P. at 260 r.p.m. for two hours.

On the trials of the Mormacpenn these capacities were easily met, and the ship attained a speed of 19.5 knots in a light condition. Northbound from Baltimore to New York to load cargo for her maiden voyage, her log shows a period when her speed exceeded 20 knots. It is calculated from these results that she will be able easily to maintain a fully-loaded service speed of 17½ knots, which would make her America's fastest cargo liner.

The following detailed description of her engines is supplied by the builders:

The base, or bedplate, is of cast-iron, in one piece, forming two longitudinal girders connected by integral bridges in which are embodied the seats for the main bearing lower half-shells. The undersides of the lower flanges of the longitudinal girders are machined, to rest upon foundations in the ship; the outside edges of these flanges are machined for lining up purposes.

The lower main bearing half-shells are steel, tinned and lined with babbitt metal, and can be rolled out without removing the crankshaft. The upper half of each main bearing is formed by the bearing cap, lined with babbitt metal. These caps are fitted closely between the jaws of the bearing seats, and each held down by a single pressure screw abutting the arch of the cylinder support, and readily accessible.

The cylinder supports, forming spacers between the bedplate and the cylinder block, are iron castings and carry the brackets for the piston cooling arrangements and for the blower supports.

The cylinder block is of cast-iron, in one piece. It is bored for the reception of the 7 cylinder liners, and forms the waterjacket for these. It contains the passages for the scavenging air to the cylinders and the exhaust gases from the cylinders.

Each cylinder liner, of Busch-Sulzer alloyed cast iron, is divided into an upper and a lower barrel. The upper barrel is provided with the scavenging and exhaust ports, and is held in place by a water cooled cast iron cylinder head, with studs of alloy steel. The lower barrel is mounted in the underside of the block. Between the upper and lower barrels there is an open space, in way of a chamber in the cylinder block; and, carried respectively by the bottom of the upper barrel and by the top of the lower barrel, sectional oil wiper rings, which embrace the piston and prevent dirty oil and gases from passing into the engine crankcase from above, and clean oil from passing into the combustion space from below. The chambers, in which substantially atmospheric pressure exists, have front and back openings in the cylinder block fitted with glass covers and electric lights, so that the pistons may be observed while the engine is in operation.

The cylinder block, cylinder supports and bedplate are combined by alloy steel tie-rods, passing from the top of the block to the underside of the main bearing bridges. There are two tie-rods at each main bearing.

Light steel removable oil-tight covers are provided for ready access to the interior of the crankcase, at front and back.

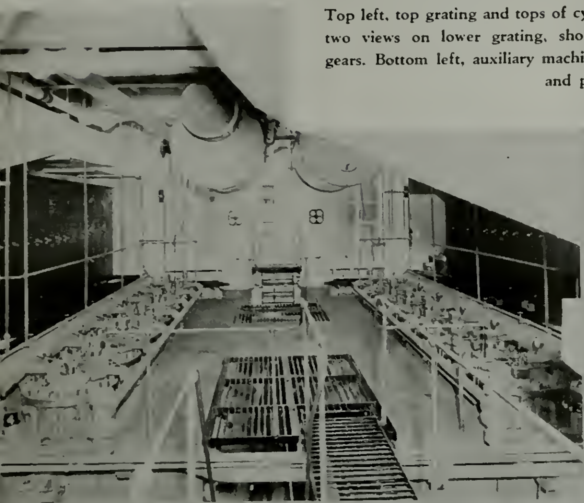
On the back of the engine is a suction header with opening for the air admission, surmounted by four rotary, positive displacement blowers, arranged in line extending substantially the full length of the engine; the blower impellers being driven, through gearing, from the crankshaft. These blowers deliver the air into a distributing chamber, immediately above them and communicating with the interiors of the cylinders by way of the scavenging passages and ports. The blowers are fitted with reversible rotary valves for maintaining the direction of air flow when the engine is reversed. The exhaust header extends along the front of the engine.

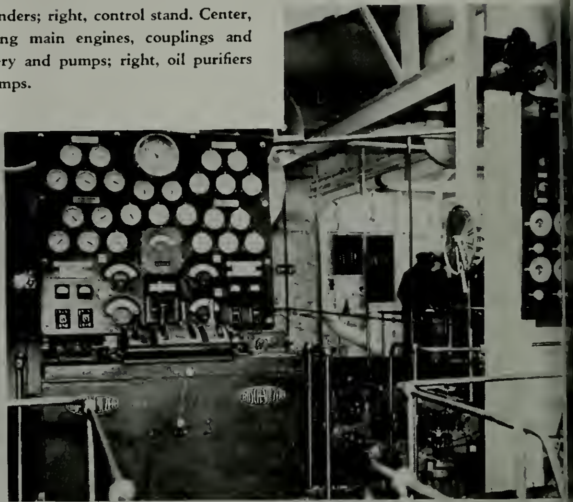
The scavenging ports are in two tiers, around approximately one-half of the circumference of the liner; the exhaust ports in one tier around approximately the opposite half. Inside the bore of the cylinder, the tops of the scavenging ports in the upper tier are higher, and the tops of the scavenging ports in the lower tier are lower than the tops of the exhaust ports. In its downward travel, the piston first uncovers the upper tier of scavenging ports; but their communication into the scavenging air receiver is closed by automatic non-return valves. The piston next uncovers the exhaust ports, and, later, the lower tier of scavenging ports. On its return stroke, the piston closes these ports in the reverse order. The sequence of occurrences in the cylinders are: towards end of the power stroke, pressure drop through the exhaust, to below the pressure of the scavening air; scavenging through the upper ports and their non-return valves; scavenging through the lower ports; closing of lower scavenging ports; closing of exhaust ports; and continued charging of combustion air into the cylinder through the upper ports until either the pressure in the cylinder equals the pressure in the scavenging air receiver or the upper ports are covered by the piston. Thus a moderate degree of supercharging is attained with free exhausting and scavenging, and without risk of a dangerous "blow-back" into the scavenging air receiver.

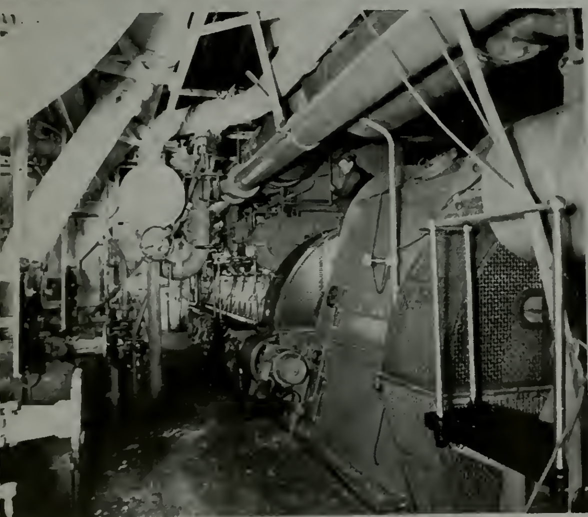
The working pistons consist of three main elements; namely, a piston top, a skirt and a wristpin housing. The forged steel piston top carries the piston rings and is cooled by the same oil as used for lubrication, the oil inlet and outlet being through telescopic tubes. The cast iron skirt, differing from the conventional construction,

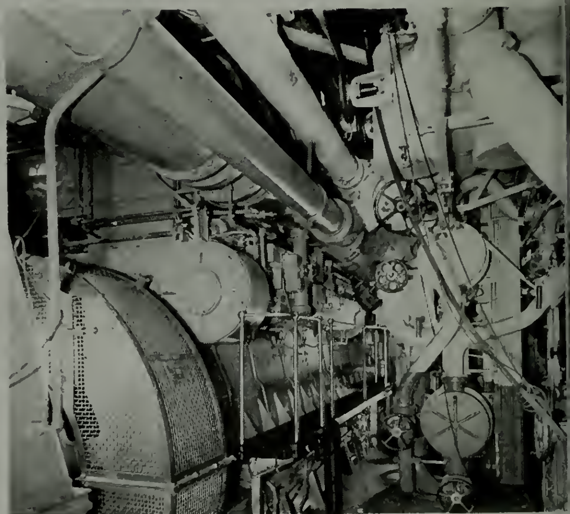
A Geared Diesel Engine Room With Electric Couplings

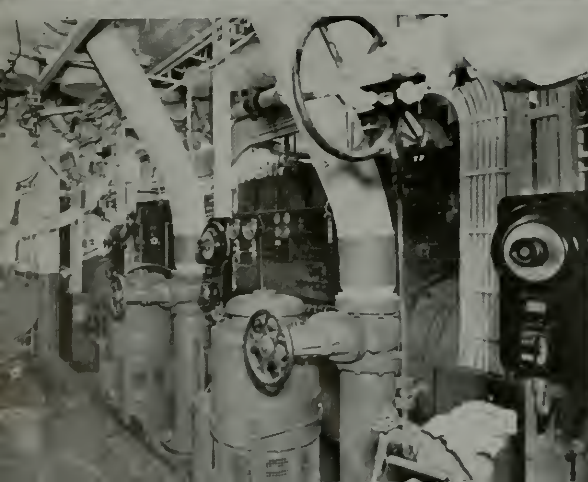
Top left, top grating and tops of cylinders; right, control stand. Center, two views on lower grating, showing main engines, couplings and gears. Bottom left, auxiliary machinery and pumps; right, oil purifiers and pumps.

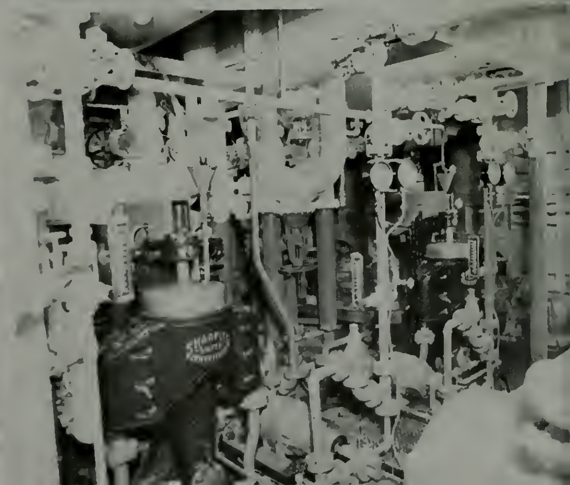












which involves heavy bosses, and bores to the outside, for the wristpin, is a plain cylindrical body of light symmetrical cross-section, without heavy accumulations of metal which tend to cause out-of-roundness, and without any opening through its wall through which lubricating oil from the wristpin could escape to the outside. The wristpin housing is attached to the piston top within the skirt and transmits the piston pressure directly to the wristpin, carried by the connecting rod, none of the pressure passing through the wall of the skirt. This housing provides a babbitt-lined bearing for the wristpin over the full length of the pin on its top or pressure side, thus greatly reducing the specific pressure between pin and bearing.

The upper end of each connecting rod is formed into a flange to which the wristpin is attached. The wristpin is a steel forging, hardened and ground on its rubbing surface, and has a flat bottomed recess milled into its underside to form the seat for the top flange of the connecting rod. The wristpin is lubricated from the piston-cooling pressure supply, and not from the crankpin through the connecting rod. The entire assembly of housing, wristpin, and connecting rod is removable from the piston without the necessity of driving the wristpin out of tight fits in piston bosses at the risk of distorting the piston.

The bottom of the connecting rod is developed as a foot, to which the crankpin bearing is attached. Shims are interposed between the foot and the bearing for the adjustment of the cylinder compression.

The crankshaft is a single-piece forging, with integral flange for attachment to the driving half of the magnetic coupling.

The fuel valves, mounted on the cylinder heads, are simple differential needle valves, hydraulically-operated by the fuel pump pressure, the opening pressure being adjustable, the fuel being injected into the combustion space through water-cooled fuel-atomizing nozzles.

The fuel pump plungers are operated by the cams, which are in duplicate, one set for running "ahead," the other for running "astern." The camshaft is driven by gears from the engine crankshaft. The quantity of fuel delivered per plunger stroke is controlled by the point of opening of a bypass or spill valve during the delivery stroke of the plunger, the excess fuel being returned to the suction side of the pump. The point of opening of the bypass is varied by means of the control gear, acting through a speed-regulating governor.

The fuel pumps are provided with manual means for cutting out the delivery of fuel to any individual working cylinder, and are connected with the overspeed governor, which interrupts the fuel delivery to all cylinders when the engine speed exceeds a predetermined maximum, automatically reestablishing the delivery when the speed falls below this maximum.

The general lubricating system of the engine is combined with the piston cooling system to the extent that a single motor-driven oil pump serves both systems. The lubrication of all except minor parts that require infrequent oiling is by the direct pressure or "force feed" method.

All return lubricating and piston cooling oil from the engine is gathered in a sump built into and part of the ship structure, but the oil from the respective systems does not mix until it leaves the engine, thus minimizing the accumulation of hot oil vapors in the crankcase. From the sump the hot oil is to be drawn through a strainer by the lubricating oil pump, and forced through a filter and a Ross cooler back to the engine.

The fresh water for cooling the cylinders and cylinder heads is circulated by a Worthington electric motor driven centrifugal pump. This water is cooled in a Ross cooler with sea water circulated by another Worthington pump.

The engine is fitted with a turning gear at the forward, or free, end of the crankshaft. The gear is normally operated by an electric motor (2-speed motor—high speed, one revolution of engine in $2\frac{1}{2}$ minutes—low speed, one revolution of engine in 5 minutes), but may be operated manually if necessary.

The unified control equipment for the four engines is brought to the central operating station, shown in one of the illustrations. This control is designed to maneuver all four engines simultaneously, or the forward pair of engines and the after pair of engines independently. The two forward engines may be run in "ahead" direction, while the two after engines run "astern," and the direction of the ship's motion may be controlled by energizing and de-energizing the respective magnetic couplings. Automatic interlocks are provided to prevent improper operation.

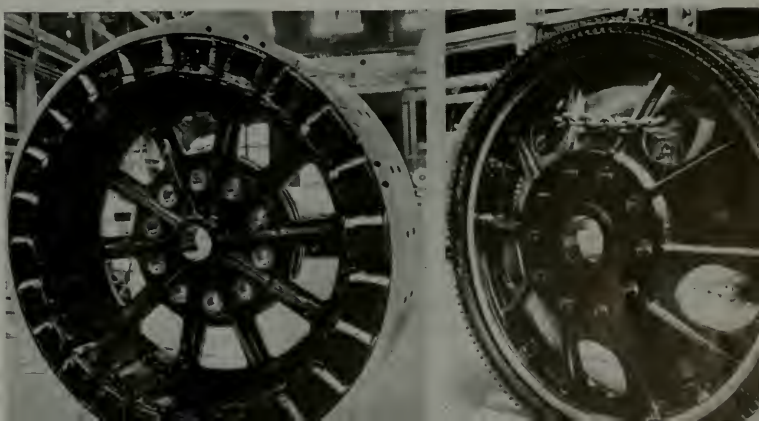
At the operating stand, an Alnor electric pyrometer system gives indication of the operating temperatures in all cylinders and enables the engineer on watch to check combustion.

A General Electric torsion meter is fitted to the propeller shaft, so that there is a close check on delivered power. The thrust of the propeller shaft is taken on a Kingsbury bearing mounted on the forward end of the gear casing.

American Manganese Bronze Company of Philadelphia supplied the four-bladed, solid bronze propeller, a wheel 21 feet 8 inches in diameter and weighing approximately 23 tons. The stern post is molded to form a contra propeller, and the rudder is of the streamlined contra flow type.

The diesel engine exhausts are led through the waste heat side of a Foster Wheeler combination waste heat and oil-burning boiler. This boiler raises steam for heating pur-

Outer and inner members of Westinghouse electric coupling.



poses, galley use and general hot water service. When the diesels are inoperative, steam is raised on the oil-burning side of the boiler, which is fitted with a Bestrol mechanical rotary cup air-atomizing oil burner, burning either diesel or boiler fuel.

In this boiler the waste heat side provides an individual section for the exhaust of each main engine. This permits maximum efficiency of the boiler for any one or more engines operating. It also permits inspection, cleaning and overhaul of any section when the corresponding engine is idle for any reason.

The heating elements in the waste heat side of this boiler are composite construction tubes consisting of extended surface gilled cast iron rings shrunk on 2-inch steel boiler tubes. This combines the strength of steel with the corrosion resistance of cast iron, and gives 6 times the heating surface of the bare tubing.

A common steam drum 36 inches in diameter and 16 feet long serves both sides of the boiler. The exhaust waste heat side has a capacity to generate 4,000 lbs. of steam an hour at 50 p. s. i. pressure. The oil-fired side will take care of 7,700 lbs. of steam an hour at the same pressure.

In the uptake of this boiler a Vortex spark arrester is fitted. The waste heat side of the boiler acts as a very effective silencer for the exhausts of the diesel engines.

Four large Burgess "Snubbers" are fitted to the air intakes of the scavenging blowers on the main engines, and the Mormacpenn engine room operates very quietly under normal conditions.

Lubrication and fuel oil for the main and auxiliary diesels are purified by two Sharples centrifuges, each of which has a capacity for 600 gallons an hour. The pumps and piping are arranged so that the centrifuges can be used on either a continuous or a batch system. On the continuous system oil is drawn from sump tanks to the centrifuges and returned, after purification, to the sump tanks. On the batch system, oil is drawn from the sump tanks and discharged to a settling tank. From the settling tank it goes to the centrifuges and is discharged either to the sump or to the service tanks.

The Electric Couplings

Power is transmitted from the engines to the gears through a new form of electric coupling, built by Westinghouse. These couplings provide an electric cushion, as the power is transmitted electrically across the air gaps of the couplings. They prevent the pulsations of engine torque from reaching the gears, and also act as disconnecting clutches by which the engine can be connected to or disconnected from the propeller instantly.

The operation of this coupling is quite simple. It consists of two rotating members, revolving together one inside the other. One is mounted rigidly on the engine shaft; the other is connected to the gear. The external member has salient field poles, connected to the ship direct-current auxiliary power supply for excitation. Rotating inside this field is the inner member with a squirrel-cage winding. The mechanical rotation of the field member creates a rotating magnetic field which induces currents in the squirrel cage. The interaction of the resulting magnetic fields creates powerful forces which cause the squirrel cage to follow the field except for a small slip, just as the secondary of a squirrel-cage induction motor follows the rotating magnetic field set up by the stator. The couplings are remarkably efficient, the efficiency being better than 97.5 per cent. Although the electric coupling is used as a clutch, it will not be used to provide any speed control.

The couplings act as torsionally flexible members and torsional dampers. The pulstations in torque from the engines are smoothed out, reducing gear wear and noise and minimizing torsional vibrations in the drive system.

Their use as disconnecting clutches is especially useful in multi-engine ships. The usual procedure when near a dock or when maneuvering in a close channel is to run half the engines ahead and half astern. The ship can then be maneuvered in either direction simply by operating a single lever which applies field to the proper couplings, thus connecting the propeller to either the ahead or astern engines as required. All speeds except "Full Ahead" or "Full Astern" can be obtained without reversing the engines and without the use of any starting air, as the engines run continuously.

The couplings also permit any engine to be shut down for adjustments without having to stop the remaining engines. At the completion of the work, the coupling is energized again, it cranks the engine and the engine is back in service immediately.

Auxiliary Machinery

Auxiliary machinery on these vessels is all electrically operated. Current for this auxiliary power, for lighting and for cooking, is supplied by three diesel-drive generating sets. The engines are Cooper Bessemer 5-cylinder, 4-cycle diesels developing 400 shaft horsepower at 450 r.p.m., and are directly connected to General Electric generators of 275 K.W. capacity, which feed 120-240 volt electricity into a three-wire system through a General Electric switchboard.

A 10-K.W. General Electric generator driven by a Sun-Doxford diesel is installed on boat deck to take care of emergency circuits. It is connected through an emergency switchboard that has a 24-volt Exide storage battery floating on the line to automatically pick up emergency circuits and to start the emergency generating set.

The connected motor load, as shown in the table herewith, is impressive:

Connected Power Load, Auxiliary Motors

No.	*Service*	*Total H.P.*
20 at 50	Winches	1,000
1 at 70	Windlass	70
1 at 50	Capstan	50
2 at 90	Compressors	180
1 at 10	Compressor	10
2 at 3	Centrifuges	6
1 at 7.5	Refrigerator	7.5
3 at 25	Refrigerators	75
1 at 15	Refrigerator	15
3 at 60	Circulating Pumps	180
3 at 50	Circulating Pumps	150
2 at 50	Steering Gear	100
3 at 75	Lub. Oil Pump	225
2 at 7½	Fresh Wash Water	15
1 at 40	F. O. Transfer	40
2 at 15	Fire and Bilge	30
2 at 50	Fire and Sanitary	100
16	Small Pumps	46
	Ventilation, etc.	30.5
Total		2,330

The pumps and the air compressors are by Worthington. All motors and controls are General Electric.

Accommodations

All accommodations are in the amidships house above the shelter deck level, and arranged as shown in the general arrangement deck plans herewith. Not more than three men are

Pilot house, chart room and radio room of M. S. Mormacpenn.

berthed in any one room. Hot and cold fresh water are piped to all accommodations, and ample bathing and sanitary facilities are installed. The plumbing fixtures are by the Mott Co.

Each berth has its individual light fixture, furnished by the Dayton Manufacturing Co. Each man has a full-sized individual steel locker, furnished by the Penn Metal Co. All the furnishings in the accommodations are of fireproof materials. All partitions are of Johns-Manville Marinite.

There are four passenger cabins on the boat deck. Each of these rooms is fitted to accommodate three passengers, and each room has its private shower, toilet and lavatory. The total accommodation provides for 46 crew and officers and 12 passengers. The joiner and cabinet work on these quarters was all done by Hopeman Brothers of New York, who installed also the Tuco heat insulation for these rooms and the Tuco insulation for the refrigerated spaces on the ship.

The galley and service pantries are electrically equipped throughout, and can furnish adequate service for 50 persons. The electrical equipment, furnished by the Edison General Electric Appliance Company, includes a cooking range, a marine griddle, a salamander broiler, a combination two-deck oven, a warming oven, a coffee urn, a hot water urn, a dish washer and a dough mixer.

Navigation Equipment

The sash windows in the wheel house were furnished by the Kearfott Engineering Company, who supplied also the outside doors for all of the midship erection. Some of these windows are fitted with electrically-operated wipers for clear vision.

Sperry gyroscopic equipment installed comprises a Mark XIV Gyro Master Compass and several repeaters, a two-unit automatic Gyro Pilot, a Rudder Angle Indicator and an 18" incandescent searchlight.

The Kelvin & Wilfrid O. White Co. installed the standard magnetic compasses and binnacle.

Radio transmitting and receiving apparatus of sufficient capacity to

(Page 45, please)

An Epic

In Pacific Ocean Salvage Tows

Showing how Young Brothers, Ltd., of Honolulu, and their "Big Chief" Tug Mamo secure pay loads both ways

At the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company, Inc., on February 26, a steel barge was christened Y.B. No. 9 and launched into San Francisco Bay. The sponsor was Miss Davis, for many years nurse at the plant hospital. She was presented with a huge bouquet of red roses and a pearl necklace by J. A. Young, first vice president and general manager of Young Brothers, Ltd., of Honolulu, owners of the barge.

Alongside the outfitting dock at the shipyard lay the tug Mamo (Big Chief), flagship of Young Brothers fleet, waiting to tow the big barge home to Honolulu. Several details were yet to be completed on the barge, and it seemed probable that she would not get away on the long tow until the 7th of March. This not because the barge construction was late, but because the arrival of the tug was early, and back of that lies the story of a rather remarkable bit of rescue work at sea.

On Christmas Eve last, an operator on the Greek steamer Calmar began to hammer out an S. O. S. from a location about 750 miles due north of Kauai. She had lost her rudder, and was in rather a bad way under heavy weather conditions. In a day or two came word that another Greek steamer, the Hymetus, had been able to give her a tow and all would be well. But towing a rudderless steamer without proper towing gear in the winter storms of the mid-Pacific is not often a success. It soon became apparent that Hymetus was not equal to the task. After losing considerable chain and cable, and being in danger of burning all of her coal supply, she gave up towing, having made only 50

Young Brothers, Ltd., tug Mamo on her trials, San Francisco Bay.

miles in a southerly direction in three or four days. She stood by, however, until the British steamer Aurora came up and offered to help. The Aurora got her cables attached to Calmar, but all she was able to do was to lose some more chain and cable.

Meanwhile the agents and underwriters at Honolulu began to fear total loss, and asked Young Brothers to send out the Mamo. The skipper of Mamo is Captain J. A. Young, Jr., son of the general manager of the firm. He got his crew away from the New Year celebrations, and, realizing that he had a tough job ahead that would take some time, provisioned the tug accordingly and filled her tanks with fuel.

The Mamo is a steel tug 129.2 feet in length, driven by twin screws, each powered with a 750-horsepower Fairbanks Morse diesel engine. She is equipped with a specially-designed Allan Cunningham electric towing winch. The drum of this winch has a capacity for 1,600 feet of $1\frac{5}{8}$" steel wire towing hawser.

She left Honolulu January 2 and made her way northward at full speed, keeping in constant touch by wireless with the Calmar and with Honolulu. The wind kept increasing in force, and on the third day was a full gale. This not only slowed progress somewhat, but increased difficulties of navigation, since no solar or stellar sights were possible.

Captain Young then directed the wireless operator on Calmar to send out a characteristic signal at short intervals. Using his radio direction finder on these signals, Captain Young was able to shape a fairly direct course through the storm to the Calmar.

On the evening of the third day out from Honolulu, Mamo arrived at the Calmar and found the Aurora still standing by. Mamo's lifeboat was somewhat battered by the storm, and on consultation it was

decided that they would wait till morning to go aboard the Calmar. At daybreak Captain Young, his mate and the wireless operator went aboard the Calmar and arranged with the captain of that vessel the details of tow line attachments, signals, use of the Calmar's engines, and use of the Aurora as a sort of stern drag to offset the lost rudder.

The Mamo got her tow lines aboard, and after paying out about 1,400 feet of wire hawser began the job of getting the freight steamer tow straightened out and headed for Honolulu.

For many hours the tug struggled to get this seemingly simple feat accomplished. For a time it appeared to be so hopeless that the underwriters started the big tug Salvage King from Victoria to help on the job. But Mamo and her young master never gave up, and by the end of the second day they were making very slow but definite progress in the right direction, and wirelessed the Salvage King that help was not needed.

From this point on to the arrival at Honolulu on January 13 it was largely a matter of getting the captains of the two freighters trained in towing technique. From 5 knots the speed increased, until the last three days ranged from 175 miles to 225 miles.

The underwriters decided that a jury rudder would be attached to Calmar at Honolulu and that she would proceed to San Francisco for permanent repairs. The Mamo came along as convoy and towed her part of the distance, and that explains why she is in San Francisco a little bit earlier than need be for towing the Y.B. No. 9 home to Honolulu.

Mamo and Captain Young have five other salvage tows to their credit in recent years. The cable steamer Dickenson from Morro Reef to Honolulu, 750 miles; the freighter Buffalo Bridge, 950 miles; the Matson freighter Honomu, pulled in from Diamond Head; and the Pan American motor schooner Trade Wind, twice pulled in.

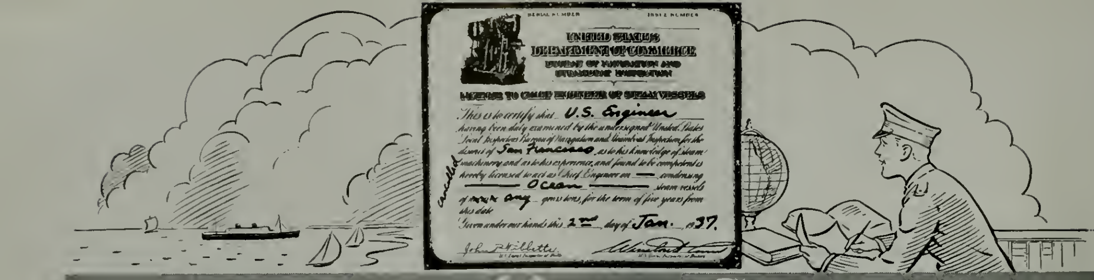
Now getting back to the barge Y.B. No. 9. This craft is built to a design which Young Brothers have found efficient in long experience handling pines from outlying islands across stretches of open sea to the canneries at Honolulu. Since they transport some 80,000 tons of this luscious fruit in a single season, they should know.

Of all-welded steel construction, this barge has a length of 175 feet, a width of 45 feet and a depth of 11 feet. Both ends are molded in a smooth curve to make towing easy and help keep a dry deck. Y.B. No. 9 differs from the former steel barges of the Young Brothers' fleet in that its interior is arranged so that one of its compartments is an oil tank holding 2,900 barrels, and another compartment is a pump room fitted with a Kinney cargo oil pump driven by a Superior diesel engine.

In building this new feature into their new barge, Young Brothers paved the way to secure a contract for inter-island transport of Shell Oil products, and Y.B. No. 9 will be towed to her home port with a full cargo of Shell Oil under her hatches.

MAMO HANGS ON

These illustrations were made from photographs taken from the deck of the Mamo. They show the Greek cargo steamer Calmar under various conditions during the salvage tow and the convoy from Honolulu to San Francisco.



Your Problems Answered by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Feed Water Treatment

IV CORROSION

QUESTION

What is the appearance and cause of corrosion?

ANSWER

Any removal of the metal of the water side of the boiler tubes and associated piping is caused by corrosion.

It may appear as a wasting away unevenly of the surface, or as pits or pockets of various sizes, or as cracks. It may go on indefinitely until the metal is reduced in thickness and fails under load, and is therefore destructive and must be prevented.

Conditions causing corrosion are:

(a) Dissolved gases.

(b) Corrosive salts.

(c) Acidity.

(d) Electrolytic action.

By far the most important of these is dissolved oxygen and carbon dioxide.

QUESTION

What is the process of gas corrosion of iron or steel?

ANSWER

Iron dissolves in pure gas-free water, slowly but definitely. It goes into solution by chemical reaction, forming ferrous hydroxide $Fe(OH)_2$, a soluble salt, and hydrogen gas, which adheres to the surface as minute bubbles or film. Ferrous hydroxide is alkaline, and as more is formed it alkalizes the water at the surface until at a Ph of 9.6[1] the chemical action stops. A sort of protective coating prevents further progress of the corrosion.

With oxygen present, liberated from its solution in the water by the temperature, it is united with the ferrous hydroxide to form ferric hydroxide, an insoluble reddish material looking much like ordinary rust.[2] This eliminates the protection of the alkaline ferrous hydroxide, and the insoluble ferric hydroxide is washed away, carrying with it the iron from the boiler surface. Thus the process proceeds. See curve, Fig. 1.

The inhibiting or protecting effect of the higher alkalinity can be produced by the addition of alkaline chemicals, such as soda ash or some of the phosphates, but this will not prevent the oxygen from combining with the ferrous hydroxide and carrying away the iron.

Even in oxygen-free water, if the velocity is great the protecting film of hydrogen and ferrous hydroxide is washed away, allowing the dissolving process to proceed unchecked. This is the case in the economizer and some feed lines. This also accounts for many erosion conditions found on impellers and points of high turbulence of water, the simple process of washing away the metal's natural film or coating of protection formed by the process of corrosion.

The presence of carbon dioxide, CO_2, in the water seems to accelerate the effect of oxygen. It has a decided acid reaction, which probably counteracts the alkaline protective coating.

QUESTION

What concentration of oxygen in water may be considered safe?

ANSWER

The safest answer is to say, allow no oxygen in the boiler water. For medium pressures, perhaps .15 to .2 cubic centimeter per liter may be found, but this is not good or safe. Any oxygen means a gradual eating away of the boiler metal.[3] Three to

[1] See full discussion of alkalinity and Ph values in next issue.

[2] Red rust is ferric oxide (FE_2O_3). Black rust, or oxygen-starved rust, is ferrous oxide (FeO), as found inside superheater or other steam pipes or under the lagging on outside of pipes, due to restriction of oxygen.

[3] Oxygen content is usually expressed as by volume cc per liter. One liter is 1,000 cc, so that this is the same as parts per 1,000 by volume. However, in much literature the same terminology for gases is used as for solids, namely, parts per million, p.p.m. This is by weight. The equivalent p.p.m. can be found by dividing the cc per liter by .7.

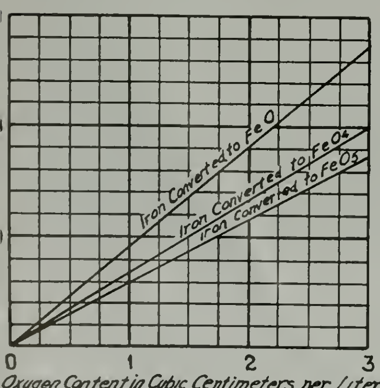
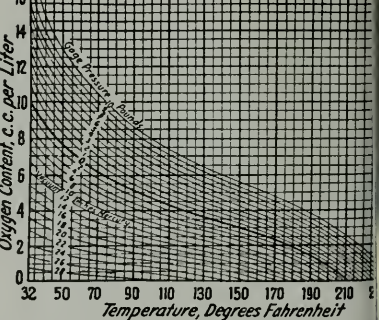


Fig. 1



Solubility of oxygen in water exposed to ordina[ry] atmosphere at given pressures.

Fig. 2

four cc per liter means definitely short life to tubes, and is definitely very serious. Less than .1 cc per liter must be maintained on modern plants.

QUESTION

Can the water-steam system be maintained so air-tight as to keep oxygen-free water?

ANSWER

No, particularly in the vacuum portions of the system. Also, oxygen is carried in with the make-up.

QUESTION

How can dissolved gases be eliminated?

ANSWER

By two general methods: (a) deaereration; and (b) chemical treatment.

QUESTION

What are the merits of these two systems?

ANSWER

Chemical methods require large quantities of chemicals to be added to remove the normal oxygen content, and are expensive, with excessive sludge.

Deaeration is simple and inexpensive, but will not ordinarily remove the gases entirely, there being traces left. This method would remove it all if the deaerator were large enough and water held in it long enough, but both of these conditions are impractical, so that for complete removal, deaeration is used to take out the large volume of gas, and chemical treatment may be used to clean up the residual.

QUESTION

What is the deaeration process?

ANSWER

Fundamentally, it is based on the principle that as the boiling point of a liquid is approached the dissolved gases pass off and bubble out.

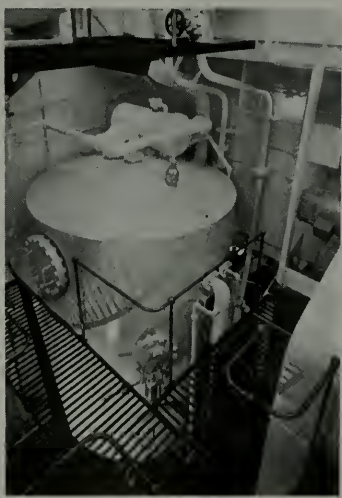
Place an uncorked glass vessel of tap water over a flame. Place a thermometer in it. At around 200° F. bubbles will form on the bottom. These are air coming out of solution; at 210° F. the air is passing off rapidly. Boiling commences at 212° F., and must continue for some time before a test for oxygen shows only a trace. Note curves, Fig. 2.

Regardless of the pressure, the gases are all removed only at the boiling point.

The open heated hot well, or open heater, is the first attempt at deaeration. But it is difficult to get the water close enough to the boiling point to be entirely effective. Also, lacking much turbulence, and due to the short time the water is at the temperature, and open, its effectiveness is reduced.

Attempts have been made to heat the condensate to the temperature corresponding to the condenser pressure and vent the gases to the condenser to be pulled off by the pumps. This is cumbersome and not sufficiently effective, lacking time and stirring or turbulence.

Time required for deareation means storage capacity for the water at temperature. Minimum time and maximum effectiveness of deaeration requires that the water be broken up into a mist or spray in an atmosphere of live steam, which must then be led off to atmosphere to liberate the entrained gas picked up from the water. This steam may be condensed in a surface condenser cooled by the incoming water.



Designed to handle 53,000 pounds an hour, this Cochrane marine type feed water deaerating heater is installed on the new C-2 cargo steamer Nightingale.

QUESTION

What is the steam and water flow in a modern deaerator heater?

ANSWER

The feed, coming in through the vent condenser, is discharged into the preheater section through spray nozzles. This space is filled with steam on its way out through the vent condenser to atmosphere.

The preheated and partially-deaerated water is collected and distributed uniformly over an atomizer, through which the incoming steam enters. The steam blowing up through the water breaks it into a mist, exposing maximum surface for easy liberation of dissolved gas. The steam with entrained gases passes up into the preheating section, where it is mostly condensed, thence on out to vent condenser and atmosphere. The deaerated water falls into the storage compartment and so back into the feed system.

The temperature of the mixture of steam and water is determined by their quantities and individual temperatures, which are adjusted to maintain the desired pressure in the shell. This is usually on the order of 10 lbs. gage, or enough to blow the gases to atmosphere.

The difference between the actual pressure in the vapor space of the preheater and the pressure corresponding to the temperature of the water in the heater is the partial pressure of the released gases, and may be used as a relative indication of the dissolved gases in the feed, as is done in purging the ammonia refrigeration system of non-condensable gases.

QUESTION

What is the chemical method of treatment for dissolved oxygen?

ANSWER

Several chemicals will absorb oxygen by chemical reaction. Among these are tannic acid, ferrous sulphate, ferrous hydroxide, iron powder and sodium sulphite (Na_2S). This last has the advantage of combining with the residual oxygen in the water to form sodium sulphate, or Glauber's salts (Na_2SO_4), which is desirable as a water treatment. It also has the advantage that, lacking oxygen, it remains as sodium sulphite, and its presence by test is conclusive proof of lack of dissolved oxygen. Ferrous sulphate, lacking oxygen in the water, will combine with the water itself and pass off so that excess cannot be maintained.

Acidity and electrolitic corrosion will be discussed in a later issue.

QUESTION FROM THE FIELD

Describe some code of bell signals from bridge to engine room.

ANSWER

Bell System from Bridge to Engine Room

(as used on American Inland Waters)

From stop to slow ahead	1 bell
From slow ahead to full speed	jingle bell
From full ahead to slow	1 bell
From slow ahead to stop	1 bell
From stop to slow astern	2 bells
From slow astern to full astern	jingle bell
From full astern to slow astern	1 bell
From slow astern to stop	1 bell
From ahead to full astern	4 bells and jingle
From full astern to full ahead	3 bells and jingle

San Francisco Gyro Compass School

The school maintained at San Francisco by the Sperry Gyroscope Company graduated the following men for the fourth quarter of 1939:

Nils J. Carlson	2nd Officer
Irving S. Hansen	Master
Salvador M. Azevedo	Machinist
Jos G. Enzenperger, Jr.	Lt. U.S.M.R.
George Foster	2nd Officer
Harold A. Lucas	Master
Paul Wissig	Chief Officer
H. F. T. Schneider	Master
Archie L. Stillman	2nd Officer
Howard P. Eidson	Ins. Repair Eng.
Edward Ayling	2nd Officer
Paul W. Dry	2nd Officer
Harold E. Richard	3rd Officer
Orlan R. Watkins	Assistant Eng.
Wesley A. Semple	Sergeant, U.S.A.
Charles R. Wolf	Cadet
Erling N. Hansen	Master
John K. van der Schuur	Chief Officer
Russell H. Abbott	Cadet
John Clague	Cadet
Lawrence E. Davis	Cadet
Frank V. Foot	Cadet
Walter M. Fox	Cadet
E. A. Gendreau	Cadet
Russell Meeker	Cadet
R. W. Racouillat	Cadet
David Schulman	Cadet
Robert Sonneman	Cadet
F. V. Thompson	Cadet
Vernon N. Urbani	Cadet
F. J. Welch	Cadet
Richard B. Wilkie	Cadet
Jack Wilson	Cadet
Bertel N. Michelsen	Cadet
W. S. Bolton	Jr. Eng.
Fred C. Der Baum	Quartermaster
William Haudt	Master
Edgar V. Carlson	Lt. (j.g.) U.S.C.G
Samuel R. Randolph	Elec. Mate 2nd c
Chan Lyman	Engineer

Deck Officers' Licenses for January

Name and Grade	Class	Cond.
SAN PEDRO		
J. F. Gillen, Chf. Mate & Pilot	SS, any GT	RG
J. B. Amiot, Jr., 3d Mate	SS, any GT	O
SAN FRANCISCO		
A. R. L. Lerch, Master	SS & MS, any GT	RG
A. H. Boyes, Master	SS & MS, any GT	RG
A. W. McWhorter, Master	SS & MS, any GT	RG
J. Lems, Master	SS & MS, any GT	RG
A. E. Milbourne, Chf. Mate	SS, any GT	RG
H. H. Cleaves, Chf. Mate	SS, any GT	RG
J. R. Edmands, 2nd Mate	SS, any GT	RG
L. A. Hoxie, 2nd Mate	SS, any GT	RG
R. B. Simpson, 2nd Mate	SS, any GT	RG
H. H. Zeissig, 2nd Mate	SS, any GT	O
J. R. Caldwell, 3d Mate	SS, any GT	O
SEATTLE		
H. Solibakke, Chf. Mate	SS, any GT	RG
A. E. Burns, 2nd Mate	SS, any GT	RG

Engineers' Licenses for January

Name and Grade	Class	Cond.
JUNEAU		
M. S. Schmitz, 3d Asst.	SS, any GT	O
PORTLAND		
A. F. Arnold, Chief	SS, any GT	RG
C. A. Green, Chief	SS, any GT	RG
G. B. Graham, Chief	MS, 500 GT	O
E. I. Hantak, 2nd Asst.	SS, any GT	O
C. H. Hudson, 2nd Asst.	SS, any GT	O
J. F. Ring, 1st Asst.	SS, any GT	RG
SAN PEDRO		
W. H. Buttram, 1st Asst.	SS, any GT	RG
H. C. Manley, 1st Asst.	SS, any GT	RG
W. T. Partridge, 2nd Asst.	SS, any GT	RG
L. M. Wiley, Chief	MS, 750 GT	O
W. H. Douglas, 2nd Asst.	MS, any GT	O
SAN FRANCISCO		
R. W. Graham, Chief	SS, any GT	RG
F. H. Black, Chief	SS, any GT	RG
R. J. Ryder, Chief	SS, any GT	RG
L. L. Chandler, 1st Asst.	SS, any GT	O
L. A. Cabral, Jr., 1st Asst.	SS, any GT	RG
J. H. Hurley, 1st Asst.	SS, any GT	RG
J. M. Bell, 1st Asst.	SS, any GT	RG
E. F. Fink, 2nd Asst.	SS, any GT	O
J. R. Bennett, 2nd Asst.	SS, any GT	O
C. L. Eversole, 2nd Asst.	SS, any GT	RG
W. E. Augros, 2nd Asst.	SS, any GT	RG
W. E. Bellamy, 2nd Asst.	SS, any GT	RG
O. R. Watkins, Chief	MS, any GT	O
SEATTLE		
V. I. Miller, Chief	MS, any GT	O
J. L. Taylor, 3d Asst.	SS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

TRADE LITERATURE

An Alco Diesel, a 16-page, handsomely-illustrated brochure in green and black, published by the diesel engine division of the American Locomotive Company.

This book describes the Alco diesel, with a range of ratings from 400 to 1200 horsepower, and its applications in the transportation, dredging, towboat, petroleum, agricultural, mining and utility industries.

The locations of the shore side installations illustrated range from the tropics to the Arctic Circle. The type of floating equipment shown includes excavating and mining dredges, tankers, Coast Guard cutters, and tugs.

Searchlights for Marine Use, a 16-page book with buff and blue cover, published by the General Electric Company as GEA-1099. Thoroughly describes and illustrates the G. E. line of incandescent and carbon-arc searchlights of the marine type for both local and district control. Gives much technical information on the use of searchlights.

Multiple Oil Film Bearing. Koppers Company, Bartlett Hayward Division, Baltimore, Md., has just issued a booklet describing its new Fast's Multiple Oil Film Bearing, for which United States rights were obtained last summer from Gustave Fast, famous designing engineer, who also designed the Fast's coupling which Bartlett Hayward has manufactured for many years.

The booklet outlines the history of bearings, discusses the principle of Fast's bearing, describes and illustrates its design, provides tables of dimensions and load capacities, dimensions of standard bearing housings, recommended shaft sizes, dimensions of lock nuts and proper oil levels.

This bearing, like the Fast's self-aligning coupling, carries the load on a plurality of perfect wedge-shaped oil films, which prevent metallic contact and wear and eliminate vibration and noise.

Elesco Superheaters is the title of a 24-page catalog just issued by Combustion Engineering Company, Inc., New York.

Details of construction of both the ball-joint and the welded types are covered, and numerous diagrams show various arrangements for application to different types of boilers and to meet different conditions.

Control of superheat by means of bypass dampers is explained. The catalog is confined to stationary practice for a wide range in pressures and temperatures.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Signaling in The U. S. Merchant Marine

The U. S. Maritime Commission has been warned by a Navy Department letter that several merchant vessels have not responded to blinker signal requests for identification, and that henceforth Navy vessels will fire a warning shot across the bow of any craft which ignores such blinker signal requests. The letter further charges that licensed deck officers of the American merchant marine are "grossly ignorant" of the use of Morse code by lamp and flag signal.

On the strength of the above report of the Navy Department, the Bureau of Marine Inspection and Navigation has made a recent ruling to the effect that all seamen or deck officers of the merchant marine going up for examination for original licenses or raise of grade must be able to receive and send 100 per cent at the rate of six five-letter words per minute by blinker and eight words per minute by semaphore.

An up-to-date, condensed, pocket-size book containing all necessary forms of signaling has been prepared recently and should be of interest to any man who follows the sea, either professionally or for pleasure, and may be purchased in any leading nautical store for a very small sum.

In view of this cracking-down on signaling, "The Skipper" has answered the following questions, which appeared in a recent Bulletin and are common to all grades of masters and mates' examinations, whether ocean or coastwise, no matter what the length of the route.

QUESTION

Describe: (1) The method of signaling by use of the International Code flags. (2) State what flags are used to introduce; (3) punctuate; (4) close spelling signals. (5) How many flags are used in such a hoist? (6) State how a numeral signal is made. (7) How many flags are used in a hoist?

ANSWER

A signal is said to be superior to another when hoisted *before*, either as regards time or hoist. It is said to be inferior to another when hoisted *after*, either as regards time or hoist.

(1) METHOD OF SIGNALING

How to Make a Signal:

Ship A (the transmitting ship), wishing to make a signal to ship B, should hoist B's signal letters superior to the signal; if this is not done, then it will be understood that ship A is addressing all ships within visual signaling distance.

If it is not possible for ship A to determine the signal letters of ship B, then A should hoist first the group V H, meaning, "You should hoist your signal letters," and at the same time hoist her own signal letters.

If this fails then ship A should hoist the group N M J, meaning, "I wish to signal to vessel—s (number indicated if necessary) on bearing indicated from me."

Each hoist should be kept flying until ship B hoists her answering pennant "close up."

When ship A has finished signaling, she is to hoist the answering pennant singly after the last hoist of the signaling, which indicates that the message is completed.

How to Answer a Signal:

Ship B (the receiving ship, or ship signaled to), on seeing the signal made by ship A, hoist her answering pennant at the "dip."

When A's hoist has been understood, B hoists her answering pennant "close up," and keeps it there until A hauls her hoist down.

B then lowers her answering pennant to the "dip," and waits again for the next hoist, and so on until the signaling is completed.

If the flags in A's hoist cannot be made out, or if, when the flags are made out, the purpose of the signal is not understood, B keeps her answering pennant at the "dip" and hoists an appropriate signal from the code to inform the transmitting ship (ship A) the reason of her inability to read the signals.

Again, when ship B can distinguish the signal made by A, but cannot understand the purport of it, then B should hoist the signal V B, meaning, "Signal is not understood though flags are distinguished."

When ship A has repeated or recti-

fied her signal and B thoroughly understands it, then B hoists her answering pennant "close up."

(2) X is used to introduce bearing signals.

T is used to introduce time signals.

P is used to introduce position signals.

(3) A decimal point between numerals is to be signaled by inserting the answering pennant where it is desired to express the decimal point.

(4) The answering pennant over G indicates that the spelling of words is completed, and that the signals which follow are to be looked up in the code in the usual manner.

(5) One flag in (2) and (3) and two flags in (4).

(6) By the numeral pennants of the code, all of which are pennant-shaped, and therefore require no further signal to indicate that they represent numbers.

(7) A hoist consists of one or more groups displayed from a single halyard.

QUESTION

How would you exchange chronometer times by flag signal?

ANSWER

Time is to be expressed in four figures, of which the first two denote the hour (from 00 = midnight up to 23 = 11 P. M.), and the last two denote the minutes (00 to 59).

When signaling time in coded messages, the four figures indicating hours and minutes are to be signaled by four numerals preceded by and joined with the letter T to form a single group, thus T0734 would indicate the time as 7h-34m A. M.

When signaling the exact time for comparison of chronometers, the exact time will be that moment at which the signal is (sharply) hauled down.

QUESTION

How would you signal a vessel whose call letters were unknown to you when there are several such vessels present?

ANSWER

I would hoist the group N M J, meaning, "I wish to signal to vessel on bearing indicated by me," at the same time giving bearing of vessel from me.

QUESTION

How do you signal to a shore station by means of the International Code?

ANSWER

The one letter signal "Z" is provided for the use of ships wishing to signal to a shore station. It may be by either flag or flashing. After it is acknowledged by the shore station, the regular procedure as between ships is used.

QUESTION

Give the "urgent signals" in both the codes.

ANSWER

F—I am disabled. Communicate with me.

K—You should stop your vessel instantly.

L—You should stop. I have something important to communicate.

O—Man overboard.

P—In harbor (blue peter)—All persons are to repair on board, as the vessel is about to proceed to sea. (Note: To be hoisted at the foremast head.) At sea—Your lights are out or burning badly.

R—The way is off my ship; you may feel your way past me.

U—You are standing into danger.

V—I require assistance.

W—I require medical assistance.

Z—To be used to address or call shore stations.

QUESTION

Why are plurals never used in the International Code Book? How do you know whether to regard the words as singular or plural?

ANSWER

The use of plurals in the International Code Book would cause great confusion.

Wishing to send a message in the plural, I would hoist the group A G Z, meaning, "Group which follows is to be read in the plural."

Wishing to send a message in the singular, I would hoist the group A H A, meaning, "Group which follows is to be read in the singular."

QUESTION

When meeting a squadron, do you dip to all the ships? If not, to which one?

ANSWER

Dip to the flagship only.

QUESTION

What is the procedure when a man-of-war desires to signal a merchant vessel?

ANSWER

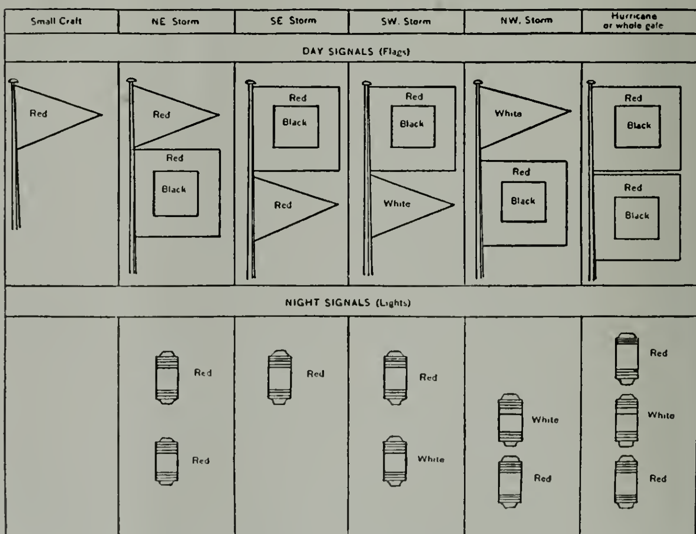
When a man-of-war wishes to communicate with a merchant vessel, she will hoist the code pennant in a conspicuous position and keep it flying during the whole of the time the signal is being made.

QUESTION

Should an ensign ever be made up and broken out?

STORM WARNING SIGNALS

[U. S. Department of Agriculture, Weather Bureau]



Sketch of storm warning signals.

ANSWER

No, never.

QUESTION

Explain the procedure of signaling by use of the International Morse Code.

ANSWER

The transmitting ship makes the call sign AA AA, etc. The receiving ship answers with the answering sign TTTTTTTTTTT, etc. The transmitting ship now carries on with the message right through the end, when she makes the ending sign AR, which will be answered by the receiving ship by R (message received). Should the receiving ship miss a word or group, she is immediately to make the repeat sign UD, and on seeing this, the transmitting ship will cease signaling and then go back a few words or groups and continue the message.

QUESTION

What does the letter "W" mean when used singly?

ANSWER

The letter "W" when used singly signifies, "I am unable to read your message owing to light not being properly trained or light burning badly." This is to be made by the receiving ship at any stage of the message, if required, and is to be answered by the transmitting ship showing a steady light until the receiving ship is satisfied with the light and ceases to make W.

QUESTION

Sketch the storm warning signals, and state where these are displayed.

ANSWER

Storm signals are displayed by the U. S. Weather Bureau at all Coast Guard Stations and numerous places on the coasts of the United States and the Great Lakes. Most of these stations are equipped for signaling by the International Code, and are prepared to transmit by telegraph and radio the message of passing vessels.

A Useful Book

Handbook of English, by Clarence Stratton; 350 pages bound in red with black stampings; published by Whittlesey House, a division of the McGraw-Hill Book Company, Inc.; price, $2.75 net.

Dr. Stratton is lecturer in English at Western Reserve University, and directing supervisor of English in Cleveland High Schools. This book may therefore be taken as an authoritative American guide to correct usage. It is in dictionary form, and covers all of the important and often troublesome problems of spoken and written language.

It makes a very handy and useful reference book for all users of English from the viewpoint of correct American usage. The treatment is fresh and thought-provoking, so that the use of this volume as a reference should inspire creative activity.

Trade Literature

Diesel Catalog: The Diesel Power & Machinery Company, with offices in Chicago, Memphis, New York and Los Angeles, announce a new looseleaf type of perpetual catalog, which is available to individuals and companies interested in used diesels, power machinery and equipment. This catalog will furnish up-to-date information on the machinery available, and as motors are added to the line, or are sold, such information will go out to those holding the perpetual catalog. Thus it will always be a ready reference for those desiring the best in used diesel equipment or other powered machinery.

A copy of this catalog may be secured by writing to the Diesel Power & Machinery Company in care of this magazine.

Hose Hints, a 32-page, profusely illustrated, 8½" x 11" booklet in black and orange, published by the United States Rubber Company.

This book was prepared in order to assist prospective buyers and present users in the intelligent selection of the proper hose for their needs and in its correct care and maintenance, so that they may obtain the longest possible trouble-free life from the various varieties of hose that they may be using. The result is an excellent handbook on industrial hose, its selection, use, maintenance and repair.

The book contains six pages of useful tables of data pertaining to the physical characteristics of hose itself and of certain liquids and gases commonly conveyed by hose.

Marine Reduction Gears, a 12-page booklet in green and black, illustrated with many halftones of gears and of ships. Publication B-2200, Westinghouse Electric and Manufacturing Company.

This book sketches the development, construction, application, operation and maintenance of Westinghouse reduction gears for marine turbine drive on ships of the merchant marine, the Coast Guard and the Navy. The first unit was tried out a little over thirty years ago. Today Westinghouse gears are transmitting over 3,000,000 shaft horsepower on American flag vessels.

M. S. Mormacpenn

(Continued from page 37)

keep the ship in touch with both ends of her route from any intermediate point was installed by the Mackay Radio & Telegraph Company, and in the wheel house there is a Mackay radio direction finder and indicator.

Mechanical engine room telegraphs and the intercommunicating telephone system were supplied by the Marine Division, Bendix Aviation Corporation.

A Fathometer for visual indication of depth of water under ship's keel was installed in the chart room by the Submarine Signal Company.

An electric sounding machine was supplied by the A. Lietz Company of San Francisco. Another San Francisco product in evidence was the Plant-Mills Engine Direction Indicators.

Electric Tachometer Co. revolution indicators are installed in the wheel house.

A Leslie air whistle controlled from wheel house is installed on the stack.

Emergency Equipment

The Mormacpenn is a one-compartment ship. That means that she can float safely with any one of her compartments open to the sea and flooded. Her complete complement of passengers and crew aggregates 58 persons. On her boat deck she carries two Welin metallic lifeboats hung in Welin quadrant davits, one boat port, the other starboard. Each of these boats is certified for 59 persons. She also carries a workboat on davits on starboard side of boat deck. This boat has a capacity for 14 persons. It will be seen that total boat capacity is nearly 250 per cent of total complement.

1939 Progress
IN ELECTRICAL WELDING

By R. F. WYER
Industrial Department
General Electric Company

The upswing in the shipbuilding industry during the past year brought about a corresponding demand for heavy welding equipment, particularly of the multiple-operator type. By their very nature, multiple-operator sets are ideally suited to use in shipyards because in this service the individual operator's duty factor is low, the load is concentrated, and space for portable welding equipment is at a premium.

In other fields, an expanded use of a-c welding was particularly noticeable. Generally speaking, the transformer-type welder proved to be the most popular a-c equipment, probably because of its higher efficiency, lower no-load loss, and absence of maintenance expense as compared with rotating-type apparatus.

An increase in the application of automatic electric arc-welding heads during 1939 was especially noteworthy. Improvements in electrodes for this use, and the general business improvement, played an important part in the wider demand for such equipment.

New Multiple-operator Equipment

A redesigned 1,500-ampere, constant-potential arc-welding set offers more compact construction, improved appearance and lighter weight. In addition, greater convenience for the operator has been brought about by mounting the control for the motor and generator on the base.

Constant-potential motor-generator sets are ideally suited for supplying the heavy current demands of modern automatic welding and the exacting requirements of production hand-welding by a number of operators.

These redesigned multiple-operator equipments are ordinarily equipped with standard d-c or polyphase a-c motors, but where power-factor improvement is desirable they can be supplied with synchronous motors.

Diesel-driven Single-operator Arc Welders

Newly introduced was a 300-amp. arc welder driven by a 4-cylinder Caterpillar diesel engine, with starting engine and clutch. The unit is particularly of interest where a welder is used 2,000 hours or more per year, since a diesel engine saves in the neighborhood of 75 per cent of the cost of fuel; it requires half the volume of fuel; and the fuel cost per gallon is also in the neighborhood of one-half. To justify the added investment with a diesel, however, the welder must be used a good part of the time.

A 200-amp. arc welder driven by a 4-cylinder Hercules engine was added. It has no self-starter, and has a lower price. In this connection it is interesting to note that some contractors insist on a hand-cranked machine because of their experience with batteries being stolen or replaced with old batteries by unauthorized persons. The new welder is unusually quiet, since it is cushioned in rubber and mounted on a fabricated steel base. It fits crosswise in a truck body, and is provided with a lifting eye for easy handling. The weight is 1,220 lbs.

Extend Range of Arc Welding Transformer

To extend the range of the 150-amp. arc-welding transformer announced the previous year, 100- and 200-amp. ratings were developed. Small size and weight and easy operating stepless control for fine adjustment of current are featured. These transformers are in red gloss finish with black top and bottom plates.

Electrodes

Conspicuous in a new line of electrodes for both manual and automatic operation is one (Type W-24) especially suitable for high-speed, single-pass, horizontal-fillet welding where good appearance is a required factor. While primarily intended for a-c welding, this electrode can also be used with d-c equipment.

Two new plants for the manufacture of electrodes were erected during the year, one at Baltimore and the other at Cleveland.

Preventing Corrosion of Lap Welds

Glyptal No. 1294 Gray and Red were developed to meet the need of fabricators for materials which, when applied to metal to be lap welded, would prevent corrosion at the point where the plates overlap. They are a pigmented version of the previously announced Glyptal 1294 Clear, and will, like the latter, prevent the adhesion of weld spatter when applied to parts before welding. On lap welds they will prevent corrosion at the overlap. At the same time, they will protect unwelded plates in storage for longer periods than Glyptal No. 1294 Clear without losing their protective qualities. They serve as an excellent base for painting. Outdoor weather tests with Glyptal No. 1294 Red show no signs of breakdown after more than two years. Glyptal No. 1294 Gray is mainly used with the resistance-welding process.

Resistance Brazing

For incandescent carbon-resistance brazing there was brought out a new outfit, comprising a low-voltage transformer, control foot switch, brazing tongs and interconnecting cables. The newly-designed brazing tongs have a fixed hinge and only one adjusting screw, and are of such small size that they are applicable to work in restricted space. The jaws, of nickel-chromium alloy steels, have high strength at elevated temperatures. The

copper straps conducting current into the jaws and thence to the carbon blocks are silver-brazed to the jaws. This brazing process has been used widely in General Electric factories many years, but outfits previously available were more expensive, and hence fields of application were limited.

Weld Recorder

Particularly advantageous for spot welding on aircraft, railway equipment and other structures where faulty welding would be disastrous, is a weld recorder, which is a recording instrument, warning device and lockout control. When a variation of the electrical input is outside preset allowable limits for successful spot welding, a bell gives a continuous audible signal, the weld-initiating circuit is opened automatically and subsequent welding is prevented until a pushbutton is pressed. Simultaneously it records on a paper chart the variations of electrical input to the primary for each weld, compared with the predetermined normal, and indicates visually the per cent variation. The weld recorder includes an ampere-squared second recording instrument, a current transformer with taps on the secondary to provide a wide range of adjustment, and other associated relays and potentiometers.

Something New In Cargo Handling Gear

Since a steamer only produces revenue when either steaming at full speed with a good cargo between ports or handling cargo in or out of as many hatches as possible when in port, it follows that cargo handling equipment is as important as the propelling machinery.

When we speak of cargo handling equipment, we refer principally to cargo booms or derricks, and winches. If the average life of a steamer is assumed to be twenty years, the cargo booms have to be hoisted and lowered and their positions changed many times, and it is in connection with handling the cargo booms that we propose to introduce a change for the better.

Let us consider a modern steamer coming into port. Such a vessel has from 12 to 24 cargo booms, each of which is 50 or more feet in length. As equipped at present, it is necessary for the chief officer to have his crew turn to several hours before reaching port. Each set of gear consists of two winches and two booms. In order to hoist a cargo boom, the winchfall has to be taken off the drum. If there is no niggerhead, or in the case of a heavy boom, the boom lift has to be made fast on the drum. The boom is then hoisted, or, in sailor's language, "topped," and the topping lift is secured to cleats on the mast. After running the topping lift off the drum, the winchfall has to be secured on the drum and the performance repeated as many times as there are booms on the ship. The mate heaves a sigh of relief if this work, which takes from two to four hours, is performed without an accident.

There is now being manufactured in Seattle by the Markey Machinery Company, Incorporated, an improved type of cargo winch, which provides safe and efficient means to hoist and lower a vessel's booms in a much simpler and more efficient manner, thus increasing efficiency, making a dangerous operation less hazardous and effecting a saving in operating costs.

On the new winch two drums are provided, one for the winchfall or runner and one for the wire topping lift, which is permanently secured on this drum. A clutch arrangement controls distribution of power to the drum to be used, leaving the other drum free. When the boom is in the desired position a brake is set up, a dog or pawl is engaged on the topping lift drum, and after shifting the clutch, disengaging the topping lift drum and engaging the bullwheel of the drum holding the winchfall, the boom is set. It is proposed to install a stopper on the mast through which the topping lift leads at all times. This stopper operating with a screw, provides means to support the boom and prevents the lift taking charge while the clutch is being shifted when it becomes necessary to trim the derricks higher or lower.

Practical men hail this new winch as an improvement which has long been overlooked. Besides minimizing the danger of falling booms, with resultant injury to personnel and damage to equipment, the new winch prolongs the life of the wire topping lift, due to the fact that this lift is always coiled on the drum. When it becomes necessary to shift the booms while a big gang of longshoremen is standing by, great savings in lost time are effected.

The topping lift drum can be installed on standard winches now in use, and the cost of installation will be offset by the saving effected in cargo operations. The safety factor alone should make the improvement worth while.

This double-action winch was designed by Captain John F. Grunbock, who is now safety engineer for the Waterfront Employers of Seattle, and has been connected with shipping out of Seattle since 1906.

Patent has been applied for, both steam and electric drive.

The Markey Machinery Company is represented in California by Geo. E. Swett & Co., Engineers, of San Francisco.

W. W. Williams Resigns From Babcock & Wilcox

W. W. Williams, General Manager of The Babcock & Wilcox Tube Company, Beaver Falls, Pa., is relinquishing his postition as of March first to go into business for himself on the Pacific Coast.

Mr. Williams became associated with the B&W organization in 1929 as sales consellor and became in turn General Sales Manager and General Manager of the B&W Tube Company. The Eastern climate greatly aggravated a bronchial condition which finally became so pronounced as to necessitate his moving to the Pacific Coast.

He will shortly announce details of his new business venture.

On the Ways— SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

BETHLEHEM LAUNCHES VICTOR H. KELLY AT SPARROWS POINT YARD

An important addition was made to the fleet of modern American tankers when the Victor H. Kelly was launched January 6 at the Sparrows Point Yard of Bethlehem Steel Company, Shipbuilding Division. The new vessel, built for Union Oil Company of California, will be used in regular service on the Pacific Coast. It was named for Victor H. Kelly, vice-president and director of sales, Union Oil Company. Mrs. Alice Marie Person, of Glendale, Calif., Mr. Kelly's daughter, christened the ship.

Union Oil of California tanker Victor H. Kelly ready for launching at Bethlehem's Sparrows Point Yard.

The Victor H. Kelly has a deadweight of about 13,000 tons and a tank capacity of 101,403 barrels, or 4,258,924 gallons, of oil. The cargo tank space is divided into 24 compartments, allowing many grades of oil to be carried at one time. Pumping capacity is designed to load or unload the vessel in less than 12 hours.

The principal dimensions are as follows:

Length overall	463 ft.
Molded beam	64 ft. 9 in.
Molded depth	34 ft. 10 in.
Draft	28 ft. 6 in.
Speed	13 knots

The propelling machinery consists of a single screw installation of Bethlehem-built steam turbines, developing 3500 shaft horsepower.

• Specifications for Transpacific P-4 Passenger Liners

On February 13 the U. S. Maritime Commission issued plans and specifications for the long-heralded P-4 design of passenger liner, and called for bids from American shipbuilders on two such vessels. The bid tenders are returnable up to May 7, and will be opened on that date.

These vessels are to be the largest ever constructed in the United States, and will be 759 feet long overall, with a beam of 98.2 feet at water line, a designed displacement of 35,000 tons and a sea speed of 24 knots. They will have a passenger capacity of 1,000, a crew of 500, and a cargo (bale) cubic of 535,000 cu. ft.

Built for easy conversion to airplane carriers, they will have funnels offset to the starboard side, leaving a fine open sports deck. The Commission estimates a cost of $22,000,000 each, so that they should be quite luxurious.

• Bethlehem Launchings and Keel Layings

The Sparrows Point Yard of Bethlehem launched their Hull No. 4338, a cargo liner for the Mississippi Shipping Company, and she was christened Delorleans by Mrs. Pedrick, wife of the vice-president and operating manager of the owning firm.

The Union Plant at San Francisco on February 26 launched a large pineapple barge for Young Brothers, Honolulu. This barge will be towed to Honolulu by the Young Brothers tug Mamo, a big Fairbanks Morse diesel job that was built at Union Plant some years back and has been making great records in inter-island and ocean towing.

Union Plant on January 19 laid a keel for the first of its five C-1 type cargo steamers, and shortly after the pineapple barge is off the ways, will lay a second keel.

Staten Island Plant on February 2 laid keels for two of five C-1 type cargo steamers building there for the Maritime Commission. This yard on January 25 had delivered the U. S. Navy fleet tug Navajo.

• Fine Tuna Clipper Delivered

On February 21 the Harbor Boat Building Co. of Terminal Island, California, delivered the "tuna bait fishing" vessel Madeirense to Madeirense Inc. of San Diego. This vessel is 125 feet long, 28 feet beam and 14 feet depth, with a gross measurement of 500 tons. She is propelled by a 600-H.P. Fairbanks Morse diesel engine and three auxiliary generating sets aggregating 450 H.P. She is equipped with quick-freezing refrigeration, makes 12 knots speed and cost $185,000.

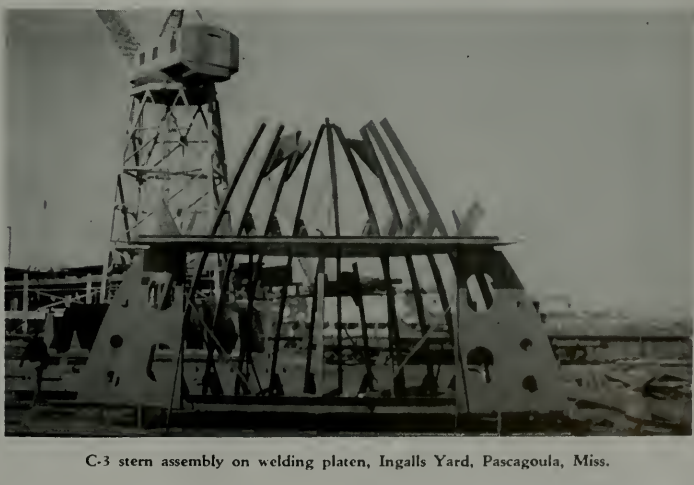
• Federal Yard Laying Down and Sliding Off

Federal laid a keel on January 22 for the first of five C-1 cargo steamers. On January 10 this yard had delivered another C-2 cargo vessel, the Flying Fish. On January 27 Hull No. 162 had been launched and christened Sea Fox, and on February 24 Hull No. 163 went over and was christened Sea Hound by Mrs. John E. Schmeltzer, wife of the assistant director of the Technical Division of the U. S. Maritime Commission. Here's hoping the hound won't chase the fox away from the outfitting dock.

Federal is preparing to put over another double launching on March 9, when the destroyers Plunkett and Kearny will both take their initial dip.

• Ingalls Shipbuilding Corporation

This firm has two yards, and reports completion by March 1 of two flat deck barges for the West Virginia Pulp and Paper Co. They have four C-3 vessels on the ways at their Pascagoula plant, and expect to launch



C-3 stern assembly on welding platen, Ingalls Yard, Pascagoula, Miss.

U. S. Maritime Commission's C-3 vessel Sea Star as she will appear when finished.

Launching of Moore-McCormack Line's C-3 cargo vessel Sea Fox at the Federal yard, Kearny, N. J., January 27. The lady bottle-smasher is Mrs. Johiah W. Bailey, wife of Senator Bailey.

the first hull in April. Four more C-3 I. N. passenger and cargo vessels are contracted for.

• Newport News Launches One and Lays One

On January 26, 1940, Newport News Shipbuilding and Dry Dock Company launched their Hull No. 371, which was christened Esso Raleigh. This is the second of the three big, fast national-defense feature tankers building at Newport News for the U. S. Maritime Commission and the Standard Oil Company of New Jersey.

Keel for Hull No. 372, third of these tankers, was laid on the vacated way on February 5.

Keel for Hull No. 382, fourth of the seven C-3 combination passenger and cargo vessels building for the round-the-world services of the American President Lines, was also laid on February 5.

• Western Pipe & Steel Co.

Without ceremony, and very quietly, the Western Pipe and Steel Company on February 9 laid the keel for the first of five C-1 motor cargo vessels for the U. S. Maritime Commission. This is the first keel for a seagoing vessel in this yard for nearly 20 years.

A LARGE CHARTER PARTY

The Maritime Commission on February 21 announced award to United States Lines Company of the Far East and Atlantic, Gulf-Australian services of the American Pioneer Line under competitive bids submitted on February 7.

The award was made under the bareboat charter provisions of the invitation for bids.

The United States Lines Company offered $7,500 for purchase of the trade name and good will of the American Pioneer Line, owned by the Commission. Its bid to charter the ships, also owned by the Commission, were as follows:

	Per month
M.S. City of Dalhart	$4,776.20
M.S. City of Elwood	4,740.32
M.S. City of Rayville	4,706.00
M.S. Jeff Davis	4,775.16
M.S. Potter	4,680.00
M.S. Tampa	4,742.40
M.S. Wichita	4,756.44
M.S. Yomachichi	4,802.20
S.S. Capulin	4,160.00
S.S. Collamer	4,167.80
S.S. Independence Hall	4,160.00
S.S. Quaker City	4,167.80

This makes a total charter hire for the 12 ships of $54,634.52, or $655,614.64 per year.

MORE NATIONAL DEFENSE TANKERS

The Maritime Commission announced on February 9 that construction of a new series of 6 national defense tankers will begin shortly. These ships are part of a 24-tanker program to be undertaken by private operators, with the Maritime Commission paying the cost of certain defense features incorporated in their design.

The new series is to be built by the Socony-Vacuum Oil Company, Inc., of New York. The vessels will be approximately 500 feet overall, with a beam of 68 feet, a designed speed of 16½ knots and single screw propulsion.

Plans and specs for this new series of tankers are now in the estimating departments of many shipbuilding firms, with bids returnable on or before March 19.

Men Against the Sea

The Prosaic Routine Voyage Report of the Master of an American Intercoastal Cargo Steamer

To the officers and men aboard strong steel hulls driven by powerful engines, there comes now and again a test that brings out the latent urge of the human will to overcome the savage forces of nature. A very apt illustration of this is found in the document prepared by Captain J. H. Masse of the S. S. Nevadan, reporting the arrival of his ship at Los Angeles, 9:24 a. m., October 29, 1939. We quote this report as reproduced in the *Bulletin* of the Bureau of Marine Inspection and Navigation:

The vessel had occasional spells of overcast and rainy weather from the canal, typical of this area at this season of the year, until the afternoon of October 24. Starting about daybreak of October 24 wind came in from ESE, a moderate breeze throughout the day until 4:00 p. m. when the wind came in strong. During this period we had occasional tropical rains with no indication of any disturbance in the vicinity, barometer ranging from 29.72 to 29.84 as it had been since leaving the Canal.

At 2:00 p. m., we had Point Telmo abeam about twelve miles. At 3:17 p. m. Black Head abeam 15 miles. At 6:35 p. m. Manzanillo Bay light abeam. From this you can see visibility, except for the occasional rains, was very good.

At 8:00 p. m. I received an advisory warning from San Francisco which read "Tropical disturbance is centered near and Southwest of Manzanillo with minimum probably 29.50 inches and moving northwestward." Wind at this time was blowing a moderate gale behind us with the usual sea accompanying it. The vessel was steaming along better than thirteen knots at the time the barometer read 29.72.

At 11:00 p. m. barometer started dropping noticeably to 29.67 and blowing a fresh gale behind us. Indications were that the storm center was behind us and approaching us, so I altered the course slightly to the left and ran for sea room.

At midnight barometer was 29.61 wind still blowing a fresh gale behind us. At 1:00 a. m. barometer had dropped 29.53. The wind had built up quite a sea by this time having blown from the one direction practically all day, and the vessel started rolling very deeply. At this time one of the boilers, on deck abreast No. 2 hatch, broke its lashings and with the next deep roll went overboard. A second boiler was adrift but we were able to get it chocked and temporary lashings passed and this way was able to save it.

From one o'clock on the barometer dropped fast. Between four and five a. m. it dropped 1.3 inches to 28.00 and at 5:30 a. m. reached as low as 27.40. The center was passing over the ship. Wind and rain let up but mountainous seas continued to roll in from all sides. Looking over the ship at this time our only real casualty was the boiler on deck abreast No. 2 hatch. Various canvas covers were blown away but everything else was apparently tight.

Immediately the storm center had passed winds came in once again of hurricane force with the attending mountainous seas. Visibility was nil; in fact, breathing without a towel over one's nose was difficult, the air was so saturated with sea water. With the great difference of pressure within the

ship as against the pressure without and the added impetus of hurricane winds, tarpaulins on No. 2, 5, 6, and 7 hatches burst open and in some cases blew away, thus allowing the sea water to find itself into the ship. Apparently a heavy sea or seas carried away No. 5 boom rest and No. 5 booms came adrift. With the deep heavy rolling of the vessel, the booms weakened the mainmast shrouds. The Mate and Second Mate lassoed the No. 5 booms and lashed them on deck. The heavy rolling, however, was too much for the mainmast with the already weakened shrouds, and it fell on deck, fouling the steering rods.

Immediately conditions were such that it was safe to allow careful men to go to the mainmast, the Chief and Second Officers picked their men and with fire axes proceeded to cut adrift the mainmast from the shrouds, stays, fouled guy pennants, topping lifts, etc., to get it overboard and clear of steering rods, also trailing gear liable to foul propeller. Engines were handled as little as possible to avoid fouling propeller—coming astern on engines so gear would trail forward and keeping stern into the heavy sea to reduce rolling as much as possible. The mainmast overboard and hatches covered, we were on our course for Los Angeles at 9:25 a. m.

The cooperation of the whole crew, officers, and men, is commendable. The officers kept me informed from their different positions as to conditions about the ship and decks; attending telegraph for correct engine movements, and seeing that helmsmen understood my orders. The engineers worked hard to keep engines going under adverse conditions where floor plates in many instances were lacking, having been rolled out of place by the excessive movement of the ship. The Chief and First Assistant Engineers when they were able to get away from the engine room came to me and asked what they could do; when I informed them of the steering gear and the ship's precarious position, they worked around a threatening, possible crushing, mainmast boom table and put the steering rod in order. This was very commendable considering the dangerous spot in which they had to work.

The attitude of the men, after the storm, in doing their best to put things back in shipshape, working on watch and off to preserve the cargo and the integrity of the ship, overhauling and renewing cargo gear where necessary so that there would be no cargo delay on arrival at Los Angeles, was commendable.

Shipbuilding Facilities Adequate

The National Council of American Shipbuilders on January 18 made public the results of a survey of privately-owned shipbuilding facilities in the United States, which was conducted at the present period, when the Maritime Commission's building program is at its height.

Membership of the Council includes approximately 80 per cent of the capacity of the country's privately-owned shipyards. The survey, however, was extended by the Council to non-member yards, as well as to those of its own organization.

The survey showed that there are available 83 active shipbuilding ways of 300 feet or more in length, suitable for building seagoing vessels in the United States. It disclosed also that there are in existing shipyards 37 additional ways in a partial state of dismantlement which could readily be made available for new construction if required to meet any national emergency need for ships.

The capacity of the 83 shipbuilding ways at present active is not less than 166 vessels of over 1,000,000 gross tons of average merchant cargo ships or tankers or their equivalent per year. Naval work is now in progress on some of these ways. This capacity readily could be increased approximately 50 per cent by conditioning the 37 inactive ways now in a partial state of dismantlement.

As to the location and size of the active shipbuilding ways in this country by districts, the survey showed that a total of 62 ways are on the Atlantic Coast. Forty of these can take ships of 500 feet and over in length, 12 can take ships up to 500 feet in length and 10 can take ships up to 400 feet in length. On the Gulf there are a total of 7 ways, of which 5 can take ships over 500 feet in length and 2 can take ships up to 500 feet in length. On the Pacific Coast there are 14 ways, 7 of which can take ships over 500 feet in length and 7 can take ships up to 500 feet in length.

In addition to these coastal shipbuilding facilities, the survey showed that on the Great Lakes there are 17 shipways occupied or available, and 3 additional ways which could readily be made available.

In announcing the results of the survey of the country's shipbuilding capacity, the National Council stressed the point that while the number of shipbuilding ways was, of course, an important factor in gaging the shipbuilding resources of the country, it was by no means the only factor to be considered, because in the final analysis ships can be built only as fast as trained personnel is available, and the material required for ship construction, such as hull steel, machinery, auxiliaries, etc., can be manufactured and assembled.

PACIFIC MARINE *Reviews*

Visiting West Coast Shipyards

J. Lewis Luckenbach, president of the American Bureau of Shipping, is currently en route to the Pacific Coast where he will make an inspection of Western shipyards. Luckenbach will inspect the Moore Dry Dock Company facilities in Oakland, Bethlehem's Union Plant in San Francisco, and the Western Pipe & Steel Company yard at South San Francisco. Four C-3 type carriers are building at Moore's; and the Bethlehem plant and the Western Pipe & Steel yard each have five C-1 type freighters on order.

Government Aid for Intercoastal Carriers

Drew Chidester, vice-president of the General Steamship Corporation, has released a communication by **O. N. Shepard** of the Shepard Steamship Company, in survey form warning of the future of American shipping in the intercoastal trade and the need for the Government to extend every possible aid in the present emergency.

Fred Doelker Announces New Grace Ship Progarm

Fred L. Doelker, vice-president and Pacific Coast manager of the Grace Line, upon his recent return to San Francisco from conferences in New York with Daulton Mann, executive vice-president of the company, announced that the Grace Line has agreed to purchase three fast new cargo ships from the United States Maritime Commission.

At present the Grace Line operates five freighters of around 5,000 gross tons each, in addition to six chartered vessels in the Pacific trade. This West Coast fleet runs from Victoria, Seattle, Tacoma, Portland and California ports down the coast to Mexico, Central America and various ports on the western coast of South America, terminating at Valparaiso, Chile.

Doelker said the new vessels, single-screw ships capable of making sixteen and a half knots, would be able to replace the five old carriers and operate on the same schedule, with a sailing every four weeks. They will be constructed on the Maritime Commission's popular C-2 design, which has received worldwide attention because of its economy in operation.

They will be 459 feet long and weigh 9,400 tons deadweight. Each vessel will have 80,000 cubic feet of refrigerated space for carrying fresh fruit southbound and frozen fish and fruits northbound. The total cargo space of each vessel will be 550,000 cubic feet, an increase of nearly 50 per cent over the old ones.

Doelker stated the company carries on the outward sailings with shipments of lumber, flour and general merchandise. The ships return with nitrates, copper ores, coffee, skins, etc. The five West Coast ships owned by the company are the Capac, Cuzco, Condor, Coya and Charcas.

The Grace Line is building two C-2 ships for its New York-Chile service, the Santa Ana and Santa Teresa, which were launched last year and are now nearing completion. In addition it has chartered two freighters from the Maritime Commission.

All of the new C-2s are to be powered by high pressure steam turbines developing 6,000 horsepower.

FRED L. DOELKER

A Report on Gjoa by Erik Krag

Erik Krag, vice-president of the Interocean Steamship Corporation, and secretary of the Gjoa Foundation, reports that the Stuart Manufacturing Company has completed a shelter for the historic discovery ship based in Golden Gate Park adjacent to the ocean highway in San Francisco.

New Executives for York

Stewart E. Lauer, president of the York Ice Machinery Corporation, recently announced the appointments of **John R. Hertzler** as general sales manager and **Ralph B. Meisenhelder** as assistant to the president.

Mr. Hertzler entered the sales student training course of the York corporation in 1927 and after two years training joined the air conditioning department. In 1930 he became active in sales engineering work in the corporation's New York territory and in 1935 returned to York as manager of the air conditioning division.

In 1937, Mr. Hertzler was appointed general representative and in January was given the important post of general sales manager, a position until recently occupied by Mr. Lauer, president of the corporation.

Mr. Meisenhelder was born in York, in 1889, and joined the York Manufacturing Company (the present York Ice Machinery Corporation) in 1906 as a clerk in the pipe shop office of the factory at York. In 1917 he became manager of the factory order department and in 1920 joined the York Products Corporation, which was at that time the exclusive York distributor for the entire western part of the United States, as manager of the accessories division.

In 1930 he returned to York as assistant to Mr. Lauer, who was then general sales manager, and is now newly appointed assistant to the president.

Daulton Mann, executive vice-president of Grace Line, announces the appointment of **Monroe Douglas Robinson** as director of sales promotion for the line. Mr. Robinson has in recent years been interested in sales promotion, publicity and advertising.

Leigh Jones Now Manufacturers' Agent

Leigh S. Jones, for a number of years purchasing agent for the Columbia Steel Company at San Francisco, has opened his own business as sales representative for several Eastern manufacturers, principally engaged in foundry and heavy engineering work. The companies Jones represents are the Continental Roll and Steel Foundry Company of So. Chicago, Indiana; National Wrought Iron Annealing Box Co., Washington, Pa.; International Mineral and Metals Co., New York; Vanadium Corporation, New York; and Treadwell Engineering Company of Easton, Pa. Jones' offices are in the Russ Building at San Francisco.

Captain J. O. Porter, until recently connected with the Insurance Division of the Maritime Commission, also having served with the old Shipping Board, has reached the retirement age, and plans to devote some time to traveling. As a boy, Capt. Porter sailed in windjammers, later in steamers, and served in the Navy during the Spanish-American and World Wars.

Melvin Perlee of APL Honored

Melvin S. Perlee has been declared the outstanding engineering cadet in the American President Lines fleet! The announcement came from **Joseph R. Sheehan,** president of the line, who presented young Perlee with a blue ribbon in recognition of his service record.

Film Shows "Duty to Cargo"

On Tuesday, February 20, a new industrial motion picture entitled "Duty to Cargo" recently completed by the American-Hawaiian Steamship Company, was shown to members of the Marine Exchange.

This film, which is in color and sound, was prepared under the supervision of Lewis Lapham. Its running time requires only twenty minutes. It denotes an entirely new step in institutional advertising by a shipping company. The first of the picture is concerned with the history of the company through its nine decades of intercoastal service, the balance with American-Hawaiian's conception of a shipowner's duty to his cargo.

McMormick Line Honors Cadet

The Pacific Argentine Brazil Line, operating from Pacific Coast ports to South America, has informed the Maritime Commission of the selection of Deck Cadet **Donald A. Thornton** as outstanding cadet on its five vessels. Ten United States Maritime Commission cadets are now employed by the Pacific Argentine Brazil Line.

Cadet (D) Thornton, First Class, was appointed to the S.S. West Nilus on July 3, 1937, and is now serving on the S.S. West Ivis. He is a graduate of Corvallis High School and attended Oregon State College. His home is in Corvallis, Oregon.

Charles L. Wheeler, Executive Vice-President of the Pacific Argentine Brazil Line, presented Cadet Thornton with the outstanding service pin aboard the S.S. West Ivis on February 7, 1940. Mr. J. A. Lunny, Vice-President of the line, Captain Westerberg of the S.S. West Ivis, and District Cadet Training Instructor Harold Nerney were present at the time the award was made.

Frank T. Kalas, general sales manager of The Electric Storage Battery Company, was elected third vice-president of the company at a recent meeting of the board of directors. He began at the bottom, soon earning promotion, and served as a salesman, branch manager, etc., until his present appointment.

Harry Abbott Passes at Honolulu

Honolulu funeral services were held for **Harry T. Abbott,** chief engineer of the Matson Navigation Company's liner Lurline, following his passing in Hawaii on February 22. He had been with the company since 1921 and was widely known in West Coast shipping circles. Born in Salinas, Abbott leaves his widow, Marion, and two sons, Stanley, 22, and Harry, Jr., 18, of Berkeley.

Bilge Club Honors David P. Fleming

The members of the Bilge Club turned out in unusual numbers at their headquarters at the California Yacht Club, Friday, February 2, to pay honor to one of their members, David P. Fleming, veteran executive of the Wilmington Transportation Company, who has lately been elevated to a new post as Chairman of the Board of the Wilmington Transportation Co.

In the absence of President Dan Dobler, who is on a vacation in Mexico City, the procedure was conducted by ex-Secretary Lloyd Moore. After introductory remarks, Moore turned over the meeting to "Bilger" Al Drew who introduced the guests and the honored member. Among those introduced, who responded with appropriate remarks, were Ex-Governor Frank F. Merriam, Doctor Parrish, Eloi Amar, Eugene Biscaluiz, Harry Woodruff, and Billy Wickersham.

Mr. Fleming, after a few well chosen remarks, introduced his successor, Mr. Carl Fenema, lately of San Franicsco, who will assume his new duties as Vice-President and General Manager of the Wilmington Transportation Co.

DAVID P. FLEMING

Names in the Marine Picture

John D. Wagner, formerly with the Philadelphia Maritime Exchange, has gone with the Curtis Bay Towing Company of Pennsylvania. He graduated from Wharton School, University of Pennsylvania, and was connected with the Maritime Exchange as statistician and marine reporter.

Major H. B. Vaughan, Jr., formerly chief of the plant and equipment section of the Corps of Engineers, is now district engineer of the War Department's Philadelphia District.

News of the Propeller Clubs of the United States

The Port of San Francisco

Tirey L. Ford
President
Frazer A. Bailey
First Vice-President
Charles L. Wheeler
Second Vice-President
Joseph R. Sheehan
Third Vice-President
Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Joseph R. Sheehan
Charles L. Wheeler

President Tirey L. Ford called a well-attended meeting to order on February 6 to introduce the two speakers of the day.

The occasion was the regular monthly meeting of the Port of San Francisco . . . at the Palace Hotel Concert Room.

First to address the members and guests was **Captain Henry Blackstone,** inaugurating a new program feature which "San Francisco" recommends for the consideration of other Ports . . . namely, a resume of progress and activity in other Propeller Club outposts. Capt. Blackstone reviewed recent happenings in and around New York, and took the opportunity to trace the general history of our international organization, which is functioning to promote the welfare of America's merchant marine.

Key speaker of this February luncheon-meeting was **James A. Quinby,** San Francisco admiralty attorney, whose subject, "The Drama Behind the Law of the Sea," proved exceptionally fascinating to his listeners.

Jim Quinby, a colorful speaker with a marked Thespian style of delivery, and inspired by the absence of a pedagogic subject, recounted incidents and dramatic anecdotes connected with notable claims cases from Pacific maritime annals. The results were heart-warming, and we can chronicle this talk as one of those rare events which tend to stimulate camaraderie and true club fellowship.

In attendance throughout the audience were top executives of many Coast steamship lines. All hands were enthusiastic in their response to the well-planned program.

Plans are now under way for the March meeting . . . the theme to be the coordination and interdependency of the Navy and Merchant Marine. The date has been tentatively set for Thursday, March the seventh.

Havana Propeller Club Celebrates Fifth Anniversary

Fifty members of the Propeller Club, Port of Havana, Cuba, accompanied by their ladies, gathered at a splendid dinner party at the Hotel Presidente, Havana, on January 23 to celebrate the Fifth Anniversary of the founding of the organization. The chartering of the Propeller Club, Port of Havana, as Port No. 36 had taken place on February 14, 1935. The anniversary celebration was advanced to January 23 in order to combine the affair with a welcome party to Honorary President Arthur M. Tode of The Propeller Club of the United States, who was in Havana en route to Mexico, Guatemala and Panama, and who, in 1935, had chartered the Propeller Club, Port of Havana. J. B. Kentis, Vice-President, and C. E. Sargent, Secretary of the Port, headed the Anniversary Committee and were accorded a hearty vote of thanks for the splendid arrangements of the evening.

Francis R. MacMahon of the United Fruit Company, and President of the Propeller Club, Port of Havana, presided and after the dinner reviewed the history and accomplishments of the club. He paid compliments to the efforts of the past-presidents Captain F. D. Graves, American Bureau of Shipping; Daniel F. Brennan, American President Lines, Ltd.; and George Griswold, Grace Line. He predicted that Propeller Clubs would be organized during 1940 at both Guantanamo and at Santiago, Cuba.

When introducing the guest of honor, Honorary President Arthur M. Tode, President MacMahon described the remarkable expansion of the national organi-

Banquet at Hotel President, Havana, Cuba, January 23, 1940, in honor of Mr. and Mrs. Arthur H. Tode, Honoarry President and Mrs. Arthur M. Elsig. Reading from left to right: Mrs. Arthur M. Elsig; Mr. F. R. MacMahon, President; Mrs. F. R. MacMahon; Mr. Arthur M. Tode, Honorary President; Mrs. Atrhur M. Tode; Brigadier-General U. S. Naval-Aviation Attache;; Mrs. J. B. Kentis; Mr. J. B. Kentis, Vice-President; Miss J. I. Foger; Mr. J. I. Foger.

Mr. F. R. MacMahon is reading to the guests a radio massage received on January 23, 1940, from Captain T. A. Scott, National President, The Propeller Club of the United States, New York, extending best wishes to Port of Havana, and honored guest Mr. Arthur M. Tode at their meeting.

As we go to press, we learn that **Arthur M. Tode**, honorary president of the Propeller Club of the United States, was welcomed at the port of Honolulu, T. H., on February 15. Interesting photographs and highlights of this special meeting of the Club will be presented in our next issue.

zation under his leadership as National President, and his successors Past National President Charles H. C. Pearsall and Captain Thomas A. Scott, the present head of The Propeller Club of the United States.

In his remarks before the gathering, Honorary President Arthur M. Tode pointed out that it had required thirteen years, from 1922 to 1935, until the national organization in the latter year chartered its 35th club, the Propeller Club, Port of Havana. "Since that time," he stated, "the worth and necessity of our efforts have been increasingly recognized and our organization has exactly doubled in numbers of Propeller Clubs formed the past five years, for on January 2, 1940, it was my privilege to charter the 72nd Propeller Club in our strong chain at San Juan, Puerto Rico."

Of particular interest to the members was a review by Mr. Tode of the present problems confronting American shipping due to the neutrality act. Also, the preliminary plans which have already been formulated for the holding of the Fourteenth Annual Convention and the American Merchant Marine Conference. There is no doubt but that the Propeller Club, Port of Havana, will be well represented when this important yearly meeting of the American shipping fraternity takes place at New Orleans on December 8 to 12, 1940.

Annual Meeting - American Bureau

The 78th Annual Meeting of the Board of Managers and Members of the American Bureau of Shipping were held January 31 in the Bureau's boardroom, 24 Old Slip, New York City.

President J. Lewis Luckenbach presided and expressed his gratitude to more than 70 Managers and Members for their attendance. Present among the membership were:

R. J. Baker, American Merchant Marine Institute; Charles Barthold, American West African Iine; Ira A. Campbell, New York; Clement L. Despard, Despard & Co.; William A. Dobson, Philadelphia, Pa.; V. B. Edwards, Dravo Corp.; Herbert F. Eggert, Marsh & McLennan; Edward P. Farley, American Hawaiian S. S. Co.; Commander R. S. Field, Bureau of Marine Inspection & Navigation; Rear Admiral Emory S. Land, Chairman, U. S. Maritime Commission; George H. French, Maryland Dry Dock Co.; J. Howland Gardner, Old Line, Conn.; W. H. Gerhauser, American Shipbuilding Co.; Walter L. Green, Seattle Tacoma

(Continued on next page)

Mariners Club News

Thanks to the fine leadership of the Mariners' Club's new administration, including hard-working committees, the big event held on Friday night, February the fourth, turned out to be a wonderful success. We were among the two hundred and fifty who came aboard, and can give "eye-witness" testimony as to the fun, fare and frolic!

The "locale" was the San Remo Restaurant down in San Francisco's historic Fisherman's Wharf district. Right in the true marine atmosphere was the piece de resistance of the banquet — to wit, good old chioppino—with prawns, cockels and crab!

A swell show regaled the diners—and there wasn't a dull moment!

One serious note preceded the merrymaking—the brief remarks of President Walter Walsh, who stated that the party had been planned with the express purpose of recapturing the original spirit of the club by "seasoning" the event with time-honored flavor of programs of the club's first years.

Among those doing grand work in making preparations and handling the routine of the gala night were Dick Glissman, chairman of the Program Committee; Stanley E. Allen, Frank Fox, Louis Siverson, Frank DePue, Fletcher Monson, and, of course, President Walter.

The spirited enthusiasm so generously in evidence at the "Cho-Ping" party has prompted the directors to make early plans for more of these friendly "get togethers" dedicated to good fellowship amongst a grand group of shipmates!

Yessir! It was "up to standard"—and that's highest praise, as anyone who has attended these affairs will allow.

Flash! President Walsh has just advised us that "beginning with the sixth day of March informal meetings of the entire membership of the Mariners' Club of California will meet on the first and third Wednesday of each month . . . at the St. Julien Restaurant at 140 Battery Street."

This sturdy young "mariner" bids fair to follow in the footsteps of his well-known father. He is Stanley E. Allen, Jr.

Peter Ditlevson, keeper of the Lime Point Lighthouse, near Sausalito, plans on retiring after thirty years' service in Government work, all spent on the Pacific Coast. Twenty-three years ago he took over the post he is just about to relinquish.

More About the American Bureau

(Continued from page 56A)

Shipbuilding Corp.; A. B. Homer, Bethlehem Steel Company; Willard F. Jones, Gulf Refining Co.; John S. Keegan, Johnson & Higgins; James J. Maguire, Socony Vacuum Oil Co.; A. M. Main, Bath Iron Works; Daulton Mann, Grace Line; John McAuliffe, Isthmian S. S. Co.; S. D. McComb, Marine Office of America; W. S. Newell, Bath Iron Works; Inman Payne, Cosmopolitan Shipping Co.; N. J. Pluymert, Socony Vacuum Oil Co.; L. N. Prior, Bureau of Marine Inspection & Navigation; John F. Purcell, Aetna Insurance Co.; Henry H. Reed, Insurance Co. of North America; John D. Reilly, Todd Shipyards, Inc.; E. R. Richardson, Ocean S. S. Co. of Savannah; P. M. Ripley, American Sugar Transit Co.; H. Harris Robson, United Fruit Co.; T. H. Rossbottom, Panama Railroad S. S. Co.; Prof. H. L. Seward, New Haven, Conn.; J. E. Slater, Export S. S. Co.; H. Gerrish Smith, National Council of American Shipbuilders; J. Barstow Smull, J. H. Winchester & Co.; R. L. Bowditch, Sprague S. S. Agency; V. J. Sudman, Black Diamond S. S. Corp.; Henry R. Sutphen, Submarine Boat Corp.; C. S. Timberlake, Hartford Fire Insurance Co.; J. Herbert Todd, Todd Shipyards, Inc.; R. C. Tuttle, Atlantic Refining Co.; S. Wiley Wakeman, Bethlehem Steel Co.; A. E. Watts, Sinclair Navigation Co.; Roger Williams, Newport News Shipbuilding & Dry Dock Co.; J. M. Willis, Bethlehem Steel Co.; Dr. R. E. Wilson, Pan American Petroleum & Transport Co.; William D. Winter, Atlantic Mutual Insurance Co.; Robert Haig, Sun Shipbuilding & Dry Dock Co.

Mr. Luckenbach was re-elected President for the eighth time and the following

were re-elected: Mr. David Arnott, Vice-President-Chief Surveyor; Mr. Jerome B. Crowley, Treasurer and Mr. John W. Cantillion, Secretary and Assistant Treasurer. Mr. Frank Gair Macomber and Mr. Joseph W. Powell were re-elected Honorary Vice-Presidents.

The following were elected to the Board of Managers for the three-year term expiring January, 1943:

Homer L. Ferguson, Basil Harris, Roger D. Lapham, James J. Maguire, Henry H. Reed, H. Gerrish Smith, Capt. Bushrod B. Howard.

The following were elected Members of the Bureau:

Captain Bushrod B. Howard, Vice-President, Standard Oil Co. of N. J., New York.

Monro B. Lanier, President, Ingalls Shipbuilding Corp., Birmingham, Alabama.

L. M. Metcalf, Marine Manager, Union Oil Co., San Francisco, California.

Joseph R. Sheehan, President, American President Lines, San Francisco, California.

Frank J. Taylor, President, American Merchant Marine Institute, New York.

Mr. Luckenbach reported that on January 31, 1940, there were 222 vessels of 1,157,365 gross tons being built to American Bureau of Shipping classifications, whereas on January 31, 1939, there were 177 vessels of 677,980 gross tons being built to the Bureau's class. This includes 20 large tankers, 105 vessels for the United States Maritime Commission, 2 cargo vessels for American Export Lines, 3 passenger-cargo vessels for Mississippi Shipping, 3 cargo vessels for Seas Shipping Company, one (1) large passenger vessel for the United States Lines, and 2 Seatrains for Seatrain Lines.

Award of the following prizes and scholarships for the year 1939 were announced by Mr. Luckenbach:

The Captain Charles A. McAllister Prize for Proficiency in Engineering at the United States Coast Guard Academy was awarded to Cadet Robert Donald Brodie, IV.

The American Bureau of Shipping Prize for excellence in studies in Naval Architecture and Marine Engineering was awarded to the following:

Edwin C. Middleton, University of Michigan; Robert S. Young, University of Michigan; Cedric Ridgely-Nevitt, Webb Institute of Naval Architecture; Robert Justice Tapscott, Massachusetts Institute of Technology.

The Stevenson Taylor Memorial Prize (Engineering Thesis) was awarded to Leslie B. Durant and John F. Ennis of Webb Institute of Naval Architecture.

The Stevenson Taylor Scholarship was awarded to H. M. Woodward and Charles B. Whitney of Massachusetts Institute of Technology.

The American Bureau of Shipping Scholarship for the Postgraduate Course in Marine Engineering at Massachusetts Institute of Technology was awarded to Edwin Roger Kirk.

Export Manager Is Named

Appointment of **J. J. Lermen Jr.** as export manager of Tide Water Associated Oil Company, announced by **President William F. Humphrey**, places at the head of the company's export department a man of wide experience in the foreign trade field.

Lermen has a background of 17 years service with Tide Water Associated Oil Company. He started with the company as a service station salesman in San Francisco in 1923 and, after eight years handling various assignments in the sales division, entered the export department in September, 1931, when he was named assistant export manager.

In 1936 Lermen spent a full year on foreign service for the company. Stationed at Manila, he maintained contact with all foreign distributors of Associated throughout Siam, French Indo-China, Netherlands East Indies, Straits Settlements, China and Japan.

Early in 1937 Lermen returned to San Francisco where he continued his work as assistant export manager until June 1, 1939, when he left for Tokyo where he is making his headquarters at present.

He is expected to return to San Francisco in June of this year, at which time, as export manager, he will direct the foreign sales of the Associated Division of Tide Water Associated Oil Company.

L. M. EDELMAN

Commander Leighton M. Edelman, aged 49, U.S.N.R., commander of the U.S.S. Newport News during the World War, and for many years head of the Naval Reserve in Oakland, died suddenly on February 27 at his home in Piedmont. Commander Edelman was supervisor of marine sales for Tidewater Associated Oil Company, with offices in San Francisco. He was considered recovering from a flu attack. "The Skipper," as he was affectionately known throughout West Coast marine circles, was president of the 12th Naval District Chapter of the Naval Reserve Officers' Association. Surviving him are his widow, Mabel, and an eighteen-year-old son.

MARINE REPRESENTATIVE

The Magnus Chemical Company, leading manufacturers of cleaning materials, industrial soap, metallic soap, sulfonated oils, emulsifying agents and metal working lubricants, offers an unusual opportunity to a man with proven sales ability, some engineering knowledge and contacts among the marine trade. Apply by letter, stating qualifications to Jos. H. Beardsley, Mgr., 95 Market St., Oakland, Calif.

Charles G. Williams has been appointed general manager of the John A. Roebling's Sons Company, Trenton, New Jersey, after serving since 1913 with the American Chain and Cable Company, Inc., with whom he rose to vice president in charge of purchasing and manufacturing operations for the fifteen plants of the company.

Charles L. Wheeler, vice president and general manager of McCormick Steamship Company, recently went to Washington, D. C., to further plans for the new ships to be allocated by the Maritime Commission for the Pacific-Argentine-Brazil Line.

Louis E. Reynolds, superintendent of the Maintenance and Repair Division of the Marine Department of The Atlantic Refining Company, passed away a short time ago after a long illness. He was born in San Francisco in 1875, and saw service in the engine departments of several steamship lines, in 1919 entering the company with which he was connected at his death.

Herbert Haslam, who was marine superintendent, vice president and a director of the Kellogg Steamship Corporation, New York, passed away recently while on a trip in New Orleans, La. He was born in Liverpool in 1884, later joined the Cunard Line, and eventually came to this country, where he was actively engaged during the rest of his life.

Maiden Voyage of the "Yusukawa Maru

The original name of this newsworthy ship was MS "Silver Cypress," built in December, 1930, by Harland & Wolff, Ltd., Belfast, Ireland, and owned by the Silver Line.

While serving around Java and the Philippine Islands a fire broke out in the engine room in January, 1937, at a Philippine port near Manila, and damaged the entire aft part of the ship, causing her to sink in the water.

The result of a careful survey by the Lloyds inspectors was that the damage was so great that repairs were absolutely out of the question. Hence, it was decided that the ship was to be salvaged and sold for scrap.

With a firm determination that the ship could be rebuilt, the "K" Line bought her at 800,000 yen, and after several negotiations, finally persuaded the Asano Dock in Yokohama to accept a contract for complete repairing for the amount of 2,200,000 yen, which was in February, 1938.

It so happened that at that time all the new materials such as steel and iron were put under Government control in Japan, and consequently the use of new materials for this repairing was entirely out of the question. Under the circumstances, they were forced to use mostly the same materials as were originally used for this ship, which, as anyone can see, was the greatest handicap in this work.

On the other hand, skilled laborers were very scarce, as many of them were recruited by the Army. Consequently, a few skilled laborers, including the engineers, had to guide young, unskilled laborers in a similar way as the college professors lead the students in the laboratory work, oftentimes trying to figure out parts together, as there was no blue print of the ship's construction available.

On account of the handicap as enumerated above, the repairs took little less than two years before completion, as against ten months as originally planned. However, the result is that a ship almost as good as a brand new one and not much inferior to the modern new super liners, worth about six million yen, was created out of nothing but scrap, by using mostly the same materials as were used originally for both hull and engine.

Upon completion of repairs in December last year, she made one round voyage from Japan to Dairen and she is now in San Francisco on her maiden voyage across the ocean with far better results than anticipated.

The gross tonnage of the ship is 6710 tons. Vessel is now berthed at Pier 45, loading a full cargo of California products for Japan. Interocean Steamship Corporation are agents in California.

Names!

The names of seven Presidents of the United States, whose terms of office span 84 years of America's most active development as a nation, have been selected for seven passenger and cargo ships being built for the sound-the-world service of American President Lines, Ltd., the United States Maritime Commission announced on February 26.

They are:

President Adams
President Monroe
President Jackson
President Van Buren
President Polk
President Hayes
President Garfield

Of the Commission-designed C-type, the ships will carry 96 passengers and a crew of 124. They are 492 feet long, 69.5 feet wide, have a designed speed of 16½ knots and are of 9,300 gross tons.

The first of them, the President Jackson, is expected to be launched by the Newport News Shipbuilding and Dry Dock Company at Newport News, Va., in the latter part of May.

The C-3 type vessels will circumnavigate the globe in 98 days including all port stops. Introduction of the seven new ships will enable American President Lines to make 26 voyages a year in this service.

A NEW

Workboat Repair Basin

The illustrations herewith give a very good idea of the new repair basin (especially adapted for purse seiners) that the famous Martinolich boat-building family of Tacoma has opened on the San Francisco waterfront at the basin just South of Pier 52.

A. C. Martinolich (or Tony, as he is known to friends) is personally supervising the completion of this plant, and will have charge of its operation.

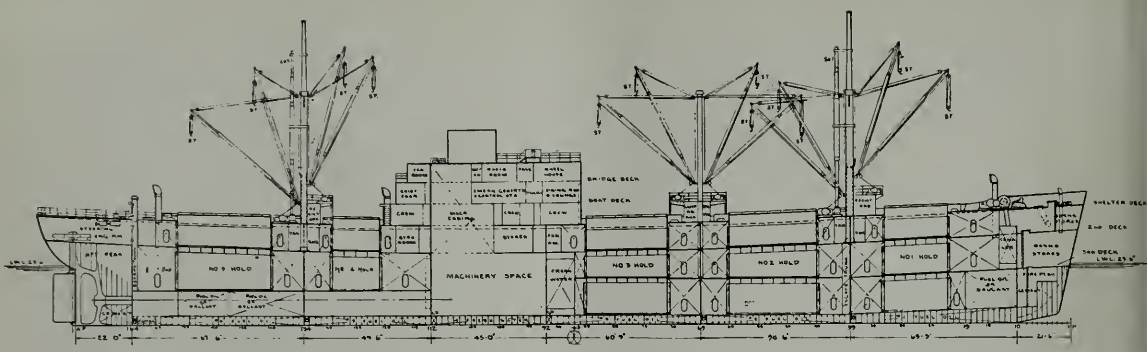
The new plant is laid out for five marine railways, and a large building across the inshore end of these ways houses the wood-working shop, the machine shop, the store room and the executive offices. New, modern machine tools with individual electric drive are being installed, and the arrangement is such as to allow ample space for efficient operation around each tool.

The marine railways will each have a capacity for 350 tons, and will be long enough to reach water deep enough so that any purse seiner, even with decks awash, can be hauled out at any time, regardless of tide conditions. Dockage space in and near the basin will be available for approximately 45 purse seiners. An oil service station and a spraying service station are to be erected, and six large net-tanning tanks will be installed for the convenience of fishboat operators.

"Tony" Martinolich

The Martinolich Shipbuilding Co. have been established at Tacoma for two generations. John A. Martinolich, the founder of this yard, is credited with the design of the first modern purse seine boat as now used so widely on the Pacific Coast. He retired in 1932 and left the management of the yard to his four sons, whom he had trained in the art and business of boat building. The yard has built 242 vessels, and many of the fine fleet of purse seiners operating from California ports were launched into Commencement Bay by the Martinolich family.

In a very real sense, this repair basin, though a strictly commercial enterprise, is an extension of Martinolich service standards to properly care for Martinolich-built boats and any others that appreciate prompt repair and overhaul service at a very handy location, where every convenience and protection is arranged for the boat owner.



Inboard profile of C-1 type cargo steamer. Westinghouse electric equipment will be installed on many of this type now building.

Twenty-Four C-1s to Have Westinghouse Equipment

The large amount of marine business going through the Westinghouse shops includes a major part of the equipment for the C-1 Type Maritime Commission ships under construction at various shipyards.

Some of this equipment includes main propulsion gears and electric couplings on the five ships building at the Todd Yard at Seattle. For the four McCormick S.S. Company vessels building at Consolidated Plant, Los Angeles, the circle W trade mark will appear on main turbines, gears, condensers, air ejectors, turbine generators, auxiliary condensers, switchboards and motors, with control for auxiliaries, including winches, capstan, windlass, steering gear, etc.

On 15 Type C-1 ships building at Bethlehem yards additional to the above, Westinghouse is supplying auxiliary electrical equipment for all deck machinery, as well as electrical control for all below deck auxiliaries.

A Notable Record

The Holland-America liner Rotterdam has recently been sold for scrap. This 24,149-ton vessel, fourth of the name operated by her owners, Nederlandsch - Amerikaansche Stoomvaart Maatschappij, has sailed continuously and regularly from Rotterdam to New York for 32 years, with the exception of a three-year lay-up during the World War.

Her keel was laid November 6, 1906, at Harland and Wolff's Belfast yard; she was launched March 2, 1908; and sailed on her maiden voyage June 13 of that year.

Her promenade deck was enclosed in plate glass windows, "an outstanding feature and a revolutionary innovation" at that date.

During her years at sea she covered 1,666,929 miles (72 times round the earth at the equator). The cost of provisions supplied to passengers and crew was $6,769,073 (much of it spent in America) and her crew wages total $6,850,372.50. She consumed 1,448,440 tons of coal and carried 1,722,510 tons of cargo and 319,853 passengers.

Pills for Temperature Control

The Tempil Corporation of New York announces a new development in chemical engineering, representing the newest technique in temperature control.

A Tempil is a pill or pellet that has a sharp and rapid melting action at a stated temperature. Thus, Tempil 200 melts at 200° F., Tempil 300 melts at 300° F. The pellets are accurate within 3 per cent of the temperature they are intended to indicate.

Each pill is stamped with the temperature at which it melts. They liquefy sharply and unmistakably at the stated temperature. In addition, the pellets for each range of temperature are made in a distinguishing color for easy identification.

The technique is simple. In application, Tempils are merely placed upon or against the heated object. When the pellet melts, the heated object has reached the stated temperature.

These pellets are safe to use. They are not corrosive to metals and have no pitting action. Any objectional stain left by their use is very easily removed. Stocks are available in whole hundred degree ranges of 200°, 300°, 400° F. and up, and on request may also be had in 50° F. intervals.

Ideal for general shop use because of their simplicity, they have been successfully employed for the past two years for controlling preheating temperatures in hundreds of welding operations; for indicating temperatures in hot operations; and for checking thermocouples. The quality of work was improved, and rejections due to cracks were minimized. Tempils are especially valuable in determining temperatures in the black heat range below 1000° F. These pellets are rapidly becoming standard practice for preheating temperature determinations in welding. Other uses readily suggest themselves, such as signaling maximum and minimum temperatures in a variety of industrial arts, and other applications.

Building in American Yards

Direct Reports from Yards as of February 1, 1940

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:
Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Contract dated September 18, 1939. Keel for first ship laid January 19, 1940.

One pineapple barge 175′ x 45′ x 11′; 650 gross tons; for Young Brothers, Ltd., Honolulu, T. H. Contract dated October 4, 1939. **Completion date March 10, 1940.**

DRYDOCK AND ROUTINE REPAIRS:
Stm. Sch. Elna, Fr. Str. Wyoming, M. S. Salawati, Capac, Vitus Bering, Mana, Admiral Gove, H. M. Storey, Peter Lassen, M. S. H. T. Harper, President Pierce, M. S. Hauraki, Alvarado, U. S. S. Nevada, Coya, Knud Rasmussen, President Coolidge.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:
One 35-ton crane all-welded steel whirley derrick barge; 120′ x 44′ x 9′; for U. S. Engineers, Bonneville, Ore. Keel laid June 5, 1939; launched September 16, 1939.

One twin screw tunnel all-welded stern towboat; 2500 H.P.; 93′ x 25′ x 6′. Keel laid October 2, 1939; launched November 11, 1939.

One 200,000-gal. capacity all-welded oil barge; 144′ x 35′ x 8′. Keel laid October 16, 1939; launching date December 22, 1939.

One 15-ton whirley derrick barge, all-welded; 93′ x 40′ x 6′. Keel laid November 25, 1939; launching date January 30, 1940.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:
Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION
Madeirense, tuna bait fishing vessel 125′ x 28′ x 14′; 500 gross tons; for Madeirense Inc., San Diego, Calif. 600 H.P. Fairbanks Morse main diesel engine; 3 auxiliaries, 450 total H.P.; 12 knots speed; cost $185,000; quick freezing refrigeration. Launching date, December 10, 1939; **delivery date about February 15, 1940.**

DRYDOCK AND ROUTINE REPAIRS:
Remodeling 105-ft. hull for purse seiner, and installing 380-H.P. Union diesel engine and complete purse seine equipment.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Launching date, October 14, 1939; **estimated delivery date, March 9, 1940.**

4750-bbl. steel oil barge for Standard Oil Co. of Calif.

DRYDOCK AND ROUTINE REPAIRS:
U. S. C. & G. S. S. Surveyor, Guide and Westdahl; Yacht Pandora; Union Oil Barges Nos. 3 and 1920; Bureau of Fisheries Penguin.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:
Argyll, U. S. C. G. Cutter Itasca, Olympic, Bahrein, M. S. Gard, Topila, M. S. Eidanger, H. D. Collier.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:
Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Covered lighter (YF-259); keel laid November 29, 1939.

Order received for construction of two fuel oil barges (Y044 and Y045), dated July 11, 1939.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

DRYDOCK AND ROUTINE REPAIRS:
Concord, McFarland, Cushing, Perkins, Preston, Smith, Kilty, Kennison, Montgomery, Sepulga, Tippecanoe, Kalmia, Beaver, Bridge, Salmon, Snapper.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:
Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; **LOA 492′ 0″, LBP 465′,** breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195, keel laid March 18, 1939; launched September 15, 1939. No. 196, keel laid September 19, 1939; launched December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission.

DRYDOCK AND ROUTINE REPAIRS:
Sutter, Tug Hercules, Gracie S., Western Traveler, Alaskan, Silverpalm, Komoku, Corneville, Nevadan, Kewanee, Tug Humaconna, J. A. Moffett, Hawaiian, H. T. Harper, Admiral Wood, Taybank, J. C. Fitzsimmons, Carolinian, Dakotan, Redline, Aegeus, Nebraskan, Transit, Tanimbar, Themoni, Willmoto, Ohioan, Panaman, Pomona, Barge Freese No. 2, Silverteak, Thorsholm, Madorea, Admiral Cole, K. G. Meldahl, Delarof, H. T. Harper, Emma Bakke, Watsonville, Lightship No. 100, Forbes Hauptman, Pacific Enterprise, San Joaquin, J. C. Fitzsimmons, Star of the Sea, McKinley, Clairy, District of Columbia, Carmar.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:
Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons; order placed by Navy Department December 7, 1937. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138); keel laid September 23, 1939; launched November 6, 1939.

Ala (YT139); keel laid September 23, 1939; launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:
Mississippi, New Mexico, Oriole, Williamson.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:
M. S. Ballard, M. S. Eli, Tug Tyee, Satartia, M. S. Kalakala, F. J. Luckenbach, Stanley Griffiths, Sutherland, Lakina, Taku, Iroquois, Heffron, Phaeax, Hollywood.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street

Tacoma, Wash.
NEW CONSTRUCTION:
Hull No. 141, purse seine fishing vessel; keel laid November 1, 1939.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.
NEW CONSTRUCTION:
Six oil barges 195′ x 35′ x 10′ for Socony-Vacuum Oil Co.
Six coal barges 175′ x 26′ x 11′ for stock.
Twenty coal barges 175′ x 26′ x 11′ for Carnegie-Illinois Steel Co.

BATH IRON WORKS
Bath, Maine
NEW CONSTRUCTION:
Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Contract date September 30, 1937; delivery dates June and August, 1940, respectively.
Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Contract dated August 15, 1938; delivery dates, December, 1940, and February, 1941, respectively.
Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Contracts dated June 15, 1939. Delivery dates June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.
NEW CONSTRUCTION:
CV7, Wasp, Airplane Carrier for U. S. Government; keel laid April 1, 1936; launched April 4, 1939.
Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; No. 1470 launched November 15, 1939.
Hulls Nos. 1476 and 1477, two freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. Keels laid, No. 1476, March 16, 1939; No. 1477, July 27, 1939. Launching date, No. 1476, December 28, 1939.
Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.
Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.
Hulls Nos. 1481-1484, four freight vessels; 450′ BP. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.
NEW CONSTRUCTION:
Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Contract signed January 3, 1938. No. 4329 launched July 8, 1939. No. 4330, keel laid December 21, 1938; launched September 9, 1939. No. 4331, keel laid September 18, 1939.
Hulls Nos. 4337, Delbrasil; No. 4338, Delorleans; and No. 4339, Delargentino; three passenger and cargo ships for Mississippi Shipping Co. Contract signed December 21, 1938. Keels laid, No. 4337, April 10, 1939; No. 4338, May 8, 1939. Launching date, No. 4337, December 16, 1939; **No. 4338, February 17, 1940.** Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.
Hull No. 4340, Victor H. Kelly, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Keel laid July 18, 1939, launched January 6, 1940.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.
NEW CONSTRUCTION:
Hulls Nos. 8002, Seminole; and 8003, Cherokee—two U. S. Navy fleet tugs. No. 8002, keel laying date December 16, 1938; launched September 15, 1939; **delivery date March 18, 1940.** No. 8003, keel laying date December 23, 1938; launching date November 10, 1939; delivery date May 1, 1940.
Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Keel laying dates, No. 8015, January 17, 1940; Nos. 8016-8017, February 2, 1940; October 15 and December 15, 1940, respectively. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.
NEW CONSTRUCTION:
BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Keel laid October 27, 1937; estimated launching date May 23, 1940; contract delivery September 1, 1941; estimated delivery date October 15, 1941.
Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.
NEW CONSTRUCTION:
One steel tug 100′ x 25′ x 12′; 805 H.P. Fairbanks-Morse engine. Delivery date May 1, 1940.
Two wooden deck scows 118′ x 36′ x 10′ for builder's account. **Delivery dates March and May, 1940.**
Two steel tugs 90′ x 23′ x 10′; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery date 1940.
DRYDOCK AND ROUTINE REPAIRS:
Ferryboat Major General William H. Hart; Tugs Hooper Boys and Comanche.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.
NEW CONSTRUCTION:
Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170′ Delivery date June, 1940.
Hull No. 167, sub-chaser PC-452, length 174′, for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.
NEW CONSTRUCTION:
Hulls Nos. 1570-1572, three welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 750 gross tons.
Hulls Nos. 1606-1608, three welded covered cargo barges 175′ x 26′ x 11′; 1590 gross tons.
Hulls Nos. 1623-1628, six welded steel coal barges 134′ x 34′ x 17′ for stock; 4602 gross tons.
Hull No. 1650, one welded steel coal barge 170′ x 40′ x 17′ for Oliver Transportation Co., Philadelphia, Pa.; 1100 gross tons.
Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.
Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.
Hulls Nos. 1653-1656, four welded steel carfloats 330′ x 40′ x 11′ for Long Island RR, Philadelphia, Pa.; 5212 gross tons.
Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.
Hulls No. 1669-1673, five welded steel coal barges 210′ x 26′ x 11′ for Wheeling Steel Corp., Wheeling, W. Va.; 2830 gross tons.
Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135′ x 26′ x 8′ for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.
Hulls Nos. 1675-1677, three welded covered cargo barges 175′ x 26′ x 11′ for Mountain City Mill Co.; 1590 gross tons.
Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.
Hulls Nos. 1687-1688, two type W-7 welded coal barges 175′ x 26′ x 10′8″ for stock; 944 gross tons.
Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.
Hulls Nos. 1690-1691, two welded steel deck lighters 80′ x 30′ x 9′ for Pennsylvania R.R.; 354 gross tons.
Hulls Nos. 1692-1701, ten welded steel car floats 250′ x 34′ x 9′ 1″ for Pennsylvania R.R.; 5940 gross tons.
Hulls Nos. 1702-1711, ten type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.
Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135′ x 27′ x 11′ 9″ for Semet Solvay Company, 290 gross tons.
Hulls Nos. 1713-1715, three welded steel oil barges 195′ x 35′ x 9′ 6″ for Latonia Refining Co., Cleveland, O.; 1746 gross tons.
Hull No. 1716, one welded steel derrick boat hull 66′ x 40′ x 6′ 6″ for McLean Contracting Co., Baltimore, Md.; 163 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.
NEW CONSTRUCTION:
Hull No. 35, Tambor (SS198); standard displacement 1475 tons; keel laying date January 16, 1939; launching date December 20, 1939; delivery date June, 1940.
Hull No. 36, Tautog (SS199); standard

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Chalmers Shipping Co. Board of Trade Building	Robert S. Gardner P. O. Box 231

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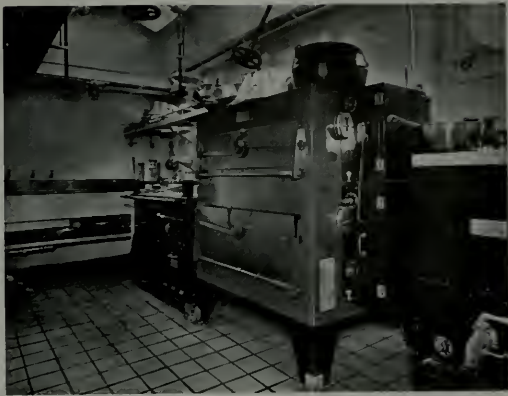

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New York Chicago Detroit Philadelphia Pittsburgh Hartford Cleveland Hamilton, Ont. London Paris Wesseling, Germany Corsico, Italy

T-475

NORTON FLOORS

ALUNDUM TILES—TREADS—AGGREGATES

displacement 1475 tons; keel laying date March 2, 1939; launched January 27, 1940; delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons: keel laying date May 15, 1939; **launching date March 27, 1940;** delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laying date December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 7, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hulls Nos. 158, Flying Fish; and 159, Comet; two C-2 cargo vessels for U. S. Maritime Commission. Keels laid May 26, 1939; launching date, December 16, 1939. **No. 158 delivered January 10, 1940.**

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Keels laid March 1, 1939; **launching date March 9, 1940.**

Hulls Nos. 162, Sea Fox, No. 163, Sea Hound; 164, 165, 166 and 167; six C-3 cargo vessels for U. S. Maritime Commission. Keels laid, No. 162, May 8, 1939; No. 163, July 24, 1939; No. 164, October 9, 1939; No. 165, November 13, 1939. **Launching dates,** No. 162, January 27, 1940; **No. 163, February 24, 1940.**

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission. Keel laid, No. 172, January 22, 1940.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J. Keels laid December 26, 1939.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Contract date March, 1939; completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels. Contract date September, 1939.

Hull No. 271, **ferryboat** for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.; 105′ x 35′ x 5′. **Completion date March 15, 1940.**

Hulls Nos. 272 and 273, **two flat deck barges** for West Virginia Pulp & Paper Co., N. Y., N. Y.; 105′ x 32′ x 7′. **Completion date March 1, 1940.**

Hull No. 274, **river towboat** for Socony-Vacuum Oil Co., N. Y., N. Y. 147′ x 35′ x 7′ 6″. Estimated completion date, August 1, 1940.

Hulls Nos. 275-276, **two oil barges,** 93′ x 36′ x 10′ 6″, for Panama Canal, Washington, D. C. Estimated completion date, May 11, 1940.

Hull No. 277, derrick barge 80′ x 38′ x 6′ for Doullut & Ewin, New Orleans, La. Estimated completion date May 15, 1940.

Hull No. 278, mooring barge 100′ x 30′ x 5′ for Standard Oil Co. of Ind., Chicago, Ill. Estimated completion date May 12, 1940.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. **Delivery date March, 1940.**

One all welded diesel electric automobile and passenger ferry 185′ 2½″ LOA x 55′ beam over guards x 15′ 6″ deep, for The Electric Ferries, Inc., NYC. Powered with 950 H.P. General Motors diesel with one 750 H.P. propelling motor. **Delivery date February, 1940.**

One all-welded twin screw automobile and passenger ferry; 132′ LOA, 43′ 8½″ beam and 10′ deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines. **Delivery date March, 1940.**

Four all-welded unmanned barges 173′ x 39′ x 8′ 6″ for Pan American Refining Co. Delivery date April, 1940.

One steel single-screw diesel tugboat 70′ x 19′ x 8′ for Pan American Refining Co.; 450 B.H.P. **Delivery date, March, 1940.**

One electric ferry 185′ 2½″ x 55′ x 15′ 6″ for Electric Ferries, Inc. Powered with 950-H.P. General Motors diesel with one 750-H.P. propelling motor. Delivery date, April, 1940.

Two all-welded unmanned barges 173′ x 39′ x 8′ 6″, for Higman Towing Co., Orange, Texas. **Delivery date March, 1940.**

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406′ x 57′ x 23.5′. Approximate dates, **keel laying, March 15, 1940;** launching date, September 15, 1940; delivery date, January 4, 1941.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

Dredge Rossell.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Keel laid August 22, 1938; launched August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keels laid, No. 370, January 16, 1939; No. 371, May 8, 1939; No. 372, February 5, 1940. Launching dates, No. 370, September 29, 1939; No. 371, January 26, 1940.

Hulls Nos. 375 and 376, two single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 8000 tons; length 435′, breadth 63′, depth 40′ 6″. Keels laid, No. 375, March 6, 1939; No. 376, May 1, 1939. Launching dates, No. 375, October 18, 1939; No. 376, December 15, 1939.

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 9100 tons. Keels laid, No. 379, October 2, 1939; No. 380, November 3, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″; gross tonnage about 9100 tons.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy; order placed December 27, 1937. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy; order placed October 14, 1938; launched December 9, 1939.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy; order placed December 1, 1938. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

PORTSMOUTH, N. H., NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Seven submarines, Searaven, Seawolf, Triton, Trout, Marlin, Grayling and Grenadier.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp; 1600 gross tons; 300′ x 65′ x 20′; steam UnaFlow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. Delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413′ x 60′ x 37′ 6″; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95′ 6″ x 24′ x 14′ 9″; steam UnaFlow propulsion; 600 H.P.; 13-knots speed; cost $200,000. Delivery dates July and August, 1940, respectively.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 182-185, four single-screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sul-

(Continued on page 66)

Building in American Yards

(Continued from page 64)

zer engines. **Delivery dates,** January 15, **February 15, March 10** and April 15, 1940, respectively.

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates October 6, 1940; December 5, 1940; February 3, 1941, and April 4, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; delivery dates April 15, 1940, and June 1, 1940.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. **Launching dates,** No. 33, October 31, 1939; No. 34, January 10, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

Something New in Rope

It is definitely news when a new discovery is made in an industry as old as the manufacture of rope. The honors for such achievement go to the Edwin H. Fitler Company, well-known pioneer ropemakers of Philadelphia.

This new rope, in sizes of 1¼ inches up, contains a controlled self-lubricating and preservative feature, which is entirely new in rope manufacture. Not only does it provide greater protection against friction and deterioration, but it serves to retain longer the original strength of the rope with complete flexibility.

In addition to the regular lubrication and water-proofing protection used throughout this rope, the center yarns of each strand are carefully impregnated and treated with a special high melting point lubricant and marine preservative that only becomes active when the rope is subjected to a working load or severe strain. The lubrication is thus scientifically controlled and focused where needed. This prevents overloading the rope with lubricant, which undesirably increases the weight of the rope.

Center yarns, due to rope construction, are shorter than the outside, or cover, yarns. They are the first to receive the strain when the rope is placed in use; and unless the center yarns of each strand are properly treated, the fibres of these yarns will chafe, burn and eventually crack, thus causing loss of tensile strength and durability of the rope itself.

With the new Fitler controlled self-lubricating feature (identified by the green yarn center), greater length of service and better all-around performance are assured.

Blue and yellow exterior striping, as in the past, identifies this new Fitler rope.

New Steam Traps

The V. D. Anderson Company has just announced the addition of two new traps to their line of steam traps, identified as No. 19 and No. 20. These new traps are designed somewhat along the lines of the larger sizes of Super-Silvertop traps, and have already proved to be a great improvement over the old No. 11 and No. 12 traps, which they supersede.

The head and body of these new traps are connected together with four bolts in a flange type connection similar to that of larger size traps. They have the bronze hexagonal bucket guide tube, and the valve and lever mechanism is of a new design, with no pins or pivots. There is a drain plug at the bottom which was not possible in the old No. 11 and No. 12 traps.

Maximum operating pressure for these traps is 200 pounds, as compared with 150 pounds on the old No. 11 and No. 12 traps. These traps have a greater capacity than the old traps, and are capable of handling considerably more dirt and foreign matter, consequently will have a long and trouble-free life.

Large Savings Through Photoelectric Relays

A manufacturer of automobile parts seven years ago installed, on a transfer press, photoelectric equipment which paid for itself in the first day of operation. Previous to the installation, the manufacturer experienced periodic trouble on his six-operation-sequence press. A part would stick on the ram, the feeding mechanism would automatically place another piece under the same ram, and when the ram came down on the two pieces the expensive die would be damaged.

To prevent this damage, six General Electric photoelectric relays were installed to watch the operation and to stop the press before the second operation, should any part stick on the ram. The contacts of the six relays were connected in series so that the establishing of a light beam between any of the light sources and its corresponding phototube acted to de-energize a solenoid and trip the clutch of the press. As a further protection, the light sources were also series-connected so that a failure in the light would bring the machine to rest. A push-button is so located that the operator can stop the machine at will.

During the first day of operation, the photoelectric relays stopped the press when a part stuck on the ram. The customer stated that the price of the protective equipment was about one-half what it had cost on previous occasions to repair the die. In other words, the equipment more than paid for itself the first day.

The photoelectric relay equipment has been running successfully for more than seven years, and it is estimated that it has saved the manufacturer $3,000 a year in maintenance, or a total saving of $21,000 to date.

PACIFIC MARINE REVIEW

APRIL, 1940

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

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*860,781 miles—3-13-40

Joe Sheehan Passes

Joseph R. Sheehan, president of the American President Lines, died suddenly on March 28 at his home in San Rafael, Calif.

Joe Sheehan, graduate from Harvard in 1910, specialist in commercial law and business, director of employment research for the S.E.C., then executive director for the Maritime Commission, came to San Francisco in October, 1938, to assume the presidency of the American President Lines. Few men in the history of San Francisco business have had such a spontaneous welcome or in so short a time made so many warm friends. It will be hard for Pacific Coast shipping men to realize that this dynamic personality, who has occupied such a large and friendly place in their lives, is now so suddenly and silently cleared on his last voyage.

The American Merchant Marine has lost one of its most enthusiastic friends. Pacific Ocean shipping has lost one of its most effective advocates. The San Francisco shipping fraternity will be sadly missing his friendly spirit.

VOLUME 37
No. 4

PACIFIC MARINE REVIEW

APRIL
1940

Foreign Sales of American Ships

The demand for cargo space, multiplied by the war and accentuated by submarine and mine sinkings, both belligerent and neutral tonnage, has caused a great rise in prices for old steamers. The American Merchant Marine is composed largely of old steamers. Hence the accelerated movement in selling old American tonnage to foreign-flag operation.

This movement has assumed such proportions that it is affecting the schedules of some intercoastal lines. In fact, one such line has sold its entire fleet, and others are trending in that direction.

All of these sales are matters of public record, since permission to sell to foreign registry must be obtained from the Maritime Commission. Records of the Commission show that during the year beginning October 26, 1938, and ending October 25, 1939, these sales included:

Twenty-nine cargo vessels, aggregating 80,127 gross tons, with an average age of 23.5 years; and 16 tankers, aggregating 125,380 gross tons, with an average age of 21.3 years.

The list for the four-month period from October 26, 1939, to February 29, 1940, included:

Sixty-four cargo or cargo-passenger vessels, aggregating 358,004 gross tons, with an average age of 20.89 years; and 3 tankers, aggregating 16,993 gross tons, with an average age of 27 years.

These figures indicate that the grand total of seagoing merchant vessels sold by American shipowners to foreign-flag ownership in the past 16 months would be 112 ships, with an aggregate gross of 580,504 tons.

They also indicate a substantial increase in the selling. During the twelve-month period, the total sales in these two classifications amounted to 205,507 gross tons, whereas in the succeeding four-month period, 374,997 gross tons were sold. An increase of 169,490 tons, or 80 per cent, more in four months than the total of the previous year.

The loss to the merchant marine fleets of the world caused by war up to the end of February, 1940, adds up to 406 vessels, with a total gross tonnage of 1,460,000. Of this total, the Allies lost 190 vessels, of 781,630 gross tons, while neutrals lost 187 vessels, of 526,621 gross tons, and Germany lost 29 vessels, of 152,353 gross tons. Losses by capture are not included in any of these figures.

It is significant that comparatively few large, fast steamers or motorships appear in these figures. The 174 ships lost by Britain average almost exactly 4,000 tons. Nearly half the number lost by Allies and neutrals combined are vessels of less than 2,000 tons.

There has been much argument over the wisdom of selling these ships, but the figures for our seagoing merchant marine, as released regularly by the Maritime Commission, and as set forth in the following tables and comment thereon, indicate that we are not unduly depleting American tonnage by these sales.

2,000 GROSS TONS AND OVER
AS OF DECEMBER 31, 1939

TABLE V

Ports	Private Ownership: Combination Passenger & Freight No.	Gross Tons	Freighters No.	Gross Tons	Tankers No.	Gross Tons	Government Ownership: Combination Passenger & Freight No.	Gross Tons	Freighters No.	Gross Tons	Tankers No.	Gross Tons	Total No.	Gross Tons
Baltimore, Md.	-	-	5	28,730	1	4,323	-	-	6	32,691	-	-	12	65,744
Balboa, Canal Zone	-	-	-	-	-	-	2[a]	19,244	-	-	-	-	2	19,244
Bellingham, Wash.	-	-	1	2,224	-	-	-	-	-	-	-	-	1	2,224
Boston, Mass.	3	12,500	1	4,015	-	-	-	-	-	-	-	-	4	16,515
Bremerton, Wash.	-	-	-	-	-	-	4	56,543	1	5,683	-	-	5	62,226
Fredrikstad, Nor.	-	-	-	-	1	6,400	-	-	-	-	-	-	1	6,400
Freeport, Tex.	-	-	1	4,127	-	-	-	-	-	-	-	-	1	4,127
Grays Harbor, Wash.	-	-	1	2,426	-	-	-	-	-	-	-	-	1	2,426
Honolulu, Hawaii	1	3,679	-	-	-	-	-	-	-	-	-	-	1	3,679
Houston, Tex.	-	-	2	5,144	1	5,335	-	-	-	-	-	-	3	10,479
Kodiak, Alaska	1	2,089	-	-	-	-	-	-	-	-	-	-	1	2,089
Los Angeles, Calif.	-	-	2	7,997	-	-	-	-	-	-	-	-	2	7,997
New Orleans, La.	-	-	-	-	-	-	-	-	45	268,937	-	-	45	268,937
New York, N. Y.	12	98,232	8	40,280	-	-	-	-	-	-	-	-	20	138,512
Norfolk, Va.	-	-	1	3,581	-	-	-	-	67	389,497	-	-	68	393,078
Patuxent River, Md.	-	-	-	-	-	-	4	82,849	-	-	-	-	4	82,849
Philadelphia, Pa.	-	-	3	8,806	-	-	-	-	-	-	-	-	3	8,806
Portland, Oreg.	-	-	1	3,453	-	-	-	-	-	-	-	-	1	3,453
Providence, R. I.	-	-	-	-	2	16,730	-	-	-	-	-	-	2	16,730
San Francisco, Calif.	8	75,562	24	89,128	1	2,630	-	-	-	-	-	-	33	167,320
Seattle, Wash.	13	56,546	7	21,995	-	-	-	-	-	-	-	-	20	78,541
Total	38	248,608	57	221,906	6	35,418	10	158,636	119	696,808	-	-	230	1,361,376

Note: [a]Panama R.R. Vessels

Since the average age of these vessels is approximately 21.5 years, we may assume that the majority were either laid up, or very soon to be laid up, at the time of sale.

Table I herewith shows that our laid-up fleet of merchant ships, 2,000 gross tons or over, on January 1, 1940, included:

One hundred and one vessels, of 505,932 gross tons, privately-owned; and 129 vessels of 855,444 gross tons, Government-owned.

A total laid-up of 230 vessels, with a combined gross tonnage of

TABLE I

1,361,376. Based on this figure, the tonnage sold foreign amounts to approximately 43 per cent of the total laid-up tonnage.

The total active American Merchant Marine fleet is shown in Table II.

From the totals of this table, we figure that the tonnage sold foreign during the past 16 months is approximately 7.5 per cent of the active American Merchant Marine.

TABLE II

American Active Merchant Fleet

Service	No. Ships	Gross Tons
Tankers	353	2,589,442
Cargo	814	4,107,850
Combination	151	1,254,718
Totals	1315	7,952,010

Table III is interesting. It shows the present employment of the 814 vessels classified as active cargo ships in Table II. Effect of the war is seen in the elimination for American vessels of some of the most-used transatlantic trade routes.

U. S. MARITIME COMMISSION
DIVISION OF RESEARCH

AMERICAN STEAM AND MOTOR MERCHANT VESSELS OF 2,000 GROSS TONS AND OVER
IN FREIGHT SERVICE
AS OF DECEMBER 31, 1939

REPORT NO. 300

TABLE III

Services	Private Ownership No.	Gross Tons	Government Ownership: U.S.M.C. No.	Gross Tons	Panama R.R. No.	Gross Tons	Total Fleet No.	Gross Tons
Nearby Foreign	34	140,570	-	-	-	-	34	140,570
Overseas Foreign								
South America								
East Coast	24	132,773	9	53,580	-	-	33	186,353
West Coast	29	168,332	2	14,338	-	-	31	182,670
Transatlantic								
Atlantic Europe & U.K. (Enroute to U.S.)	7	39,890	-	-	-	-	7	39,890
Portugal & Spain	3	17,915	1	5,010	-	-	4	22,925
Bergen & Trondheim	2	9,893	-	-	-	-	2	9,893
Baltic	-	-	1	4,963	-	-	1	4,963
Mediterranean	28	155,975	2	10,157	-	-	30	166,132
India via Suez	14	84,920	4	22,829	-	-	18	107,749
East & South Africa	17	105,380	-	-	-	-	17	105,380
West Africa	7	38,224	-	-	-	-	7	38,224
Transpacific								
Orient & Far East	29	172,238	9	50,410	-	-	38	222,648
Australasia	4	20,661	4	24,605	-	-	8	45,266
Around the World	7	39,866	-	-	-	-	7	39,866
Foreign Trading Foreign								
Foreign Trading Foreign	-	-	-	-	-	-	-	-
Total Foreign	205	1,126,637	32[a]	185,892	-	-	237	1,312,529
Coastwise								
Atlantic & Gulf	165	674,646	-	-	-	-	165	674,646
Pacific	43	119,979	-	-	-	-	43	119,979
Intercoastal	145	834,465	-	-	-	-	145	834,465
Hawaii	27	166,384	-	-	-	-	27	166,384
Puerto Rico	20	74,922	-	-	-	-	20	74,922
Total Coastwise	400	1,870,396	-	-	-	-	400	1,870,396
Government Service	-	-	1[b]	6,211	-	-	1	6,211
Laid Up Vessels	57[c]	221,906	119[d]	696,808	-	-	176	918,714
Total Freighters	662	3,218,939	152	888,911	-	-	814	4,107,850

Notes: a 2 of these "Idle Status" with Managing Operators and 21 under bare-boat charter
b Loaned to War Department
c Includes 2 Vessels of 12,481 Gross Tons Laid Up as the result of the Neutrality Act
d Includes 6 Vessels of 32,691 Gross Tons Allocated to United States Lines Laid Up as the result of the Neutrality Act
23 Undocumented Vessels of 135,460 Gross Tons

AMERICAN STEAM AND MOTOR MERCHANT VESSELS OF 2,000 GROSS TONS AND OVER
IN TANKER SERVICE
AS OF DECEMBER 31, 1939

TABLE IV

Services	Private Ownership		Government Ownership U. S. M. C.		Total Fleet	
	No.	Gross Tons	No.	Gross Tons	No.	Gross Tons
Nearby Foreign	19	133,135	-	-	19	133,135
Overseas Foreign						
South America						
East Coast	-	-	-	-	-	-
West Coast	2	15,485	-	-	2	15,485
Transatlantic						
Atlantic Europe & U.K.	-	-	-	-	-	-
Portugal & Spain	-	-	-	-	-	-
Bergen & Trondheim	-	-	-	-	-	-
Baltic	-	-	-	-	-	-
Mediterranean	-	-	-	-	-	-
India via Suez	-	-	-	-	-	-
East & South Africa	-	-	-	-	-	-
West Africa	-	-	-	-	-	-
Transpacific						
Orient & Far East	5	32,832	-	-	5	32,832
Australasia	-	-	-	-	-	-
Around the World	-	-	-	-	-	-
Foreign Trading Foreign	1[a]	12,395	-	-	1	12,395
Total Foreign	27	193,847	-	-	27	193,847
Coastwise						
Atlantic & Gulf	269	2,011,667	-	-	269	2,011,667
Pacific	30	196,165	-	-	30	196,165
Intercoastal	15	112,347	-	-	15	112,347
Hawaii	6	39,998	-	-	6	39,998
Puerto Rico	-	-	-	-	-	-
Total Coastwise	320	2,360,177	-	-	320	2,360,177
Laid Up Vessels	6	35,418	-	-	6	35,418
Total Tankers	353	2,589,442	-	-	353	2,589,442

Note: [a]In Overseas Foreign

The totals of Table I and Table II combined show an American seagoing merchant marine of 1,545 vessels, with 9,313,386 gross tons, of which the tonnage sold foreign is a little over 6 per cent.

During 1939 American shipyards delivered 28 seagoing merchant vessels, with a gross tonnage of 251,900.

During 1940 our shipyards will deliver at least 45 vessels, with a gross tonnage approximating 400,000, and in succeeding years this output will be maintained and exceeded.

The average sea speed of these new vessels will be at least 50 per cent greater than the speed of the vessels being sold. With these figures in mind, there would seem to be no need for alarm over the "disappearance of the American Merchant Marine."

Some lines, and notably intercoastal lines, are seizing the opportunity to sell all their obsolete tonnage. Already this movement has caused a shortage of bottoms in some trades and a great deal of inconvenience to shippers.

The most obvious solution is the so-called Shepard plan, which proposes that the Maritime Commission encourage the selling of intercoastal tonnage to foreign flag account in order that the intercoastal operators may build up reserves for the construction of new tonnage, and that in the interim the laid-up Government-owned merchant ships be chartered to these operators at reasonable rates so that the services can be maintained.

This seems a very reasonable proposition, but, as usual, there is a legal technicality obstruction action. Present law will not allow the Maritime Commission to charter laid-up ships over 20 years old, and there are less than 20 of the laid-up ships under that age.

Under the present emergency conditions it would be good business to release these vessels for charter or sale foreign, so as to realize something more than their value as scrap steel.

Typical of the modern fleet being built under the U. S. Maritime Commission, the passenger liner America (shown here at the outfitting dock, Newport News, Virginia) will be the safest, most fireproof and most comfortable liner afloat.

U. S. Coast and

Gets Fine New Steel

Lake Washington Ship
Most Modern and Best-

by Chas.

Explorer's stern is beautifully molded.

Holding the distinction of being the largest new steel vessel built on the North Pacific Coast during the past 16 years, the handsome, cruiser-like Explorer has been delivered by her builders, the Lake Washington Shipyards, to the U. S. Coast and Geodetic Survey, and is now on tour to California ports preparatory to a long shakedown cruise in Western Alaska waters.

While not the largest vessel ever built for Government service, the Explorer is without doubt one of the finest and most beautifully-equipped survey vessels ever ordered by Uncle Sam. Following designs laid down by the Bureau, in Washington, D. C., the prominent Seattle firm of W. C. Nickum Sons executed the detail plans and worked out unusual construction procedure, the results of which are clearly evident in all parts of the vessel's structure and in placement and type of machinery found throughout the ship.

Working on behalf of the Service was Comm. A. M. Soberalski, who not only supervised construction but also will take command of the new ship on her first voyage. The Explorer brings the United States Survey fleet to 11 major units, scattered on the Atlantic, Gulf and Pacific Coasts.

Lake Washington Shipyards have handled many unusual and difficult ship construction and repair jobs, ranging from a motley collection of Puget Sound ferry vessels, whaling fleets, floating canneries, and barges, to many specialized Government vessels of highly individual character. Charles A. Burkhart is president of this organization, Paul E. Voinot is vice-president and general manager, and A. R. Van Sant is treasurer. Noteworthy among their recent contributions to marine architecture are the diesel-drive ferries Chippewa and the world-famous Kalakala, first of the modern type, fully streamlined ferries that are now all the vogue.

The new vessel Explorer is outstanding for several reasons:

(1) Her unusual lines—more like a private yacht than a hard-working mothership for a Coast Survey fleet.

(2) Her almost 100 per cent fireproof and 100 per cent collision-proof construction, made possible by 99½ per cent use of fireproof materials, and hull subdivision and plating that more than doubly meet the requirements for this class of vessel.

(3) Laid out for a crew of nearly 90, this 200-foot ship is a complete city in herself, being equipped for a six-months' voyage away from her operating base, and with accommodations planned to assure unusual comfort to a widely-assorted personnel, including seamen, engineers, technicians and surveyors, besides service facilities for a fleet of smaller vessels and many shore stations. A hospital, machine shop, electric shop, carpenter shop, laundry, and a regular marine garage are some of the other items that are included to make this ship independent from outside help in her job of charting the bleak, almost unknown Alaska coastline far into the Bering Sea.

(4) The surveying equipment aboard the Explorer is said to be the most elaborate and costly ever placed aboard any of the world's survey fleet. All of the best American and foreign equipment and accessory gear was studied and modi-

The new Explorer at her home station, with the old wooden Coast and Geodetic Survey steamer Explorer in background.

Geodetic Survey Steamer Explorer

yards Delivers America's Equipped Survey Vessel

F. A. Mann

The Cunningham steering engine and telemotor was built by Markey Machinery Co.

fied and elaborated upon to outfit the vessel.

Her electric and mechanical survey gear, the fleet of auxiliary vessels and the radio equipment are unlike any combination ever placed on a similar ship. Her auxiliary equipment is time-tested, huskily built, based on the widest possible use of high-pressure, superheated steam. All deck machinery and all major auxiliaries are steam driven. Only the delicate survey equipment is 100 per cent electrified—a wise combination assuring non-interference from a maze of ship's circuits and switching gear, and useful in cold northern climates that require plenty of heat and dry circulating air to every part of the ship.

Hull Construction

The vessel is of heavy steel construction, completely fireproof, and is of the two-compartment standard of hull subdivision, more than double the requirements for vessels of this class. Two compartments can be flooded without danger of sinking. She is divided into nine watertight compartments by eight transverse bulkheads extending to the main deck. Only three of the bulkhead walls are pierced by passage openings, and these are fitted with watertight doors controlled electrically from the bridge. The shell plating is riveted at the seams and welded at butt joints. Over 90 per cent of the balance of the hull joints are welded. A ½-inch-thick steel belt plate, extending 6 feet on the sides, above and below the waterline, has been welded to the hull for protection against damage by ice and while working inshore and from service fleet operations overside. The double bottom amidships extends up to the level of the main decks, forming tanks with capacities for 325 tons of fuel, 99 tons of boiler water, and 75 tons of culinary water. Sufficient oil can be carried for 7,000 miles cruising range at 12 knots speed.

Layout of the Ship

Forward, in the chain locker below, are carried 120 fathoms of ⅞-inch special link chain, to which are rigged a pair of 3,000-pound Baldt stockless anchors. A Markey double vertical shaft-type combination windlass and capstan is fitted on the forecastle deck just forward of entrance to crew's quarters, and is driven by a Markey steam engine installed on the deck directly beneath. Directly aft of the chain

Dimensions and Main Equipment

Length over all	220 feet 8 inches
Beam	38 feet
Depth	23 feet 2 inches
Loaded draft	15 feet 2 inches
Displacement tons (light)	1,500 tons
Displacement tons (loaded)	1,800 tons

Power:

Two Babcock & Wilcox tubular boilers with built-in superheaters fired by B. & W. oil burners; 2,000 horsepower double reduction geared DeLaval turbine with built-in condenser and thrust bearing.

Auxiliary Electric Power:

Two 50-kilowatt, 115-volt D. C. Westinghouse turbo-generators; 25-kilowatt Westinghouse AC-DC converter for layups or shore hookups; 5-kilowatt generator for sounding equipment; 10-kilowatt emergency set, driven by 2-cylinder Superior diesel.

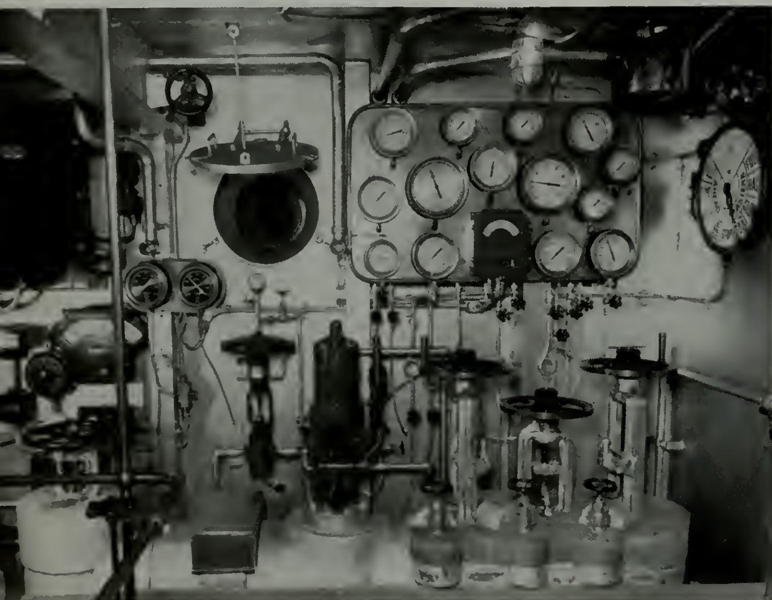
Deck Machinery:

Windlass, capstan, steering gear and boat hoists.—Markey Machinery Company of Seattle. All steam driven.

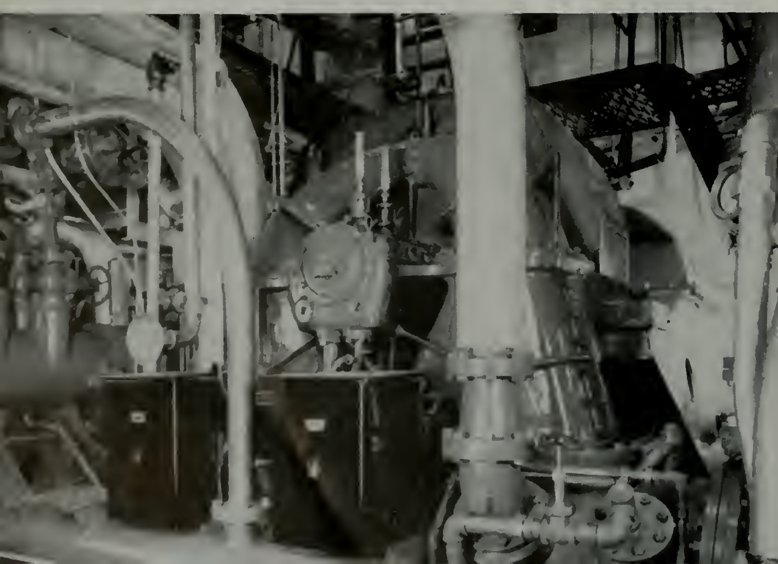
Fire Protection:

All interior paneled spaces covered with Johns-Manville Flexboard (asbestos). Furniture is aluminum tubular type.—General Fireproofing Co., Youngstown, Ohio. Flooring, special rubber compound made by Armstrong Cork and Tile. Fire extinguishing system consists of special 6-bottle system for boiler room; 6-bottle system connected to the Richaudio smoke detection system centered in the pilot house and connected to every compartment on the ship, which, in addition to visible evidence in the pilot house control station, will sound an alarm and enable the officer on watch to flood any one or group of compartments with CO_2 gas. In connection with the fire system is a 12-station Automatic Electric Co. (Chicago) telephone, and a Remler loud speaker-public address system, in addition to an alarm circuit and regulation water and hose fire-fighting system.

locker are three large refrigerated compartments and a group of dry stores compartments, adequate for long voyages away from supply base, and to handle the requirements of a complement of 90 men under all conditions. The largest of the compartments has ample storage for 10 tons of foodstuffs. Directly aft of this space is the meat storage room, and beside it, on the port side, is the vegetable room. The main and meat storage is refrigerated by a direct-expansion ammonia system, supplied by a York motor-driven compressor. The vegetable room is supplied by a fan-driven cooling unit. A unique feature of the refrigerated spaces is the 14-inch-thick glass wool insulation, and the soldered, smooth Monel metal surface, which entirely lines all food storage spaces. The smooth, non-tarnishing metal surface can be easily cleaned and sterilized.



Top: Firing front of one of the Babcock & Wilcox boilers.
Center: Control stand in engine room.
Lower: De Laval main propulsion turbine.



All dry food stores are lined with metal bins and compartments, enameled white. Food storage spaces, including refrigerated space, each have two entrance-exit doors, one opening to the ship's passageways and the other to a central hatchway leading upward to the main deck hatch.

Following the refrigerated cargo space, in the lower hold, is the engineer's storeroom and a completely-equipped carpenter shop, capable of handling repairs to the fleet of workboats and to shore stations. Next follows the machinery space, aft of which are fitted two 1,500-gallon gasoline and diesel oil storage tanks for operation of the workboat fleet, then a gasoline and diesel fuel pump room and a 5-ton magazine for powder used in depth charges for deep-sea sounding operations. Aft is the steering-engine room, equipped with a Markey steam steering engine, operating an Oertz streamlined rudder. A 3-bladed Navy design Doran propeller is fitted. Lignum vitae stern bearings are used.

On the main deck (middle), forward, is crew's space for 24 in a large forecastle, and quarters for 12 petty officers, one group on each side of the ship. Aft of this are quarters for eight chief petty officers, a fully-equipped four-bed hospital and surgeon's office, and a neat little laundry, equipped with a Thor washer, three porcelain laundry trays and a steam clothes drier. Aft of the machinery compartment are quarters for 12 junior officers, a large lounge and quarters for 10 senior officers.

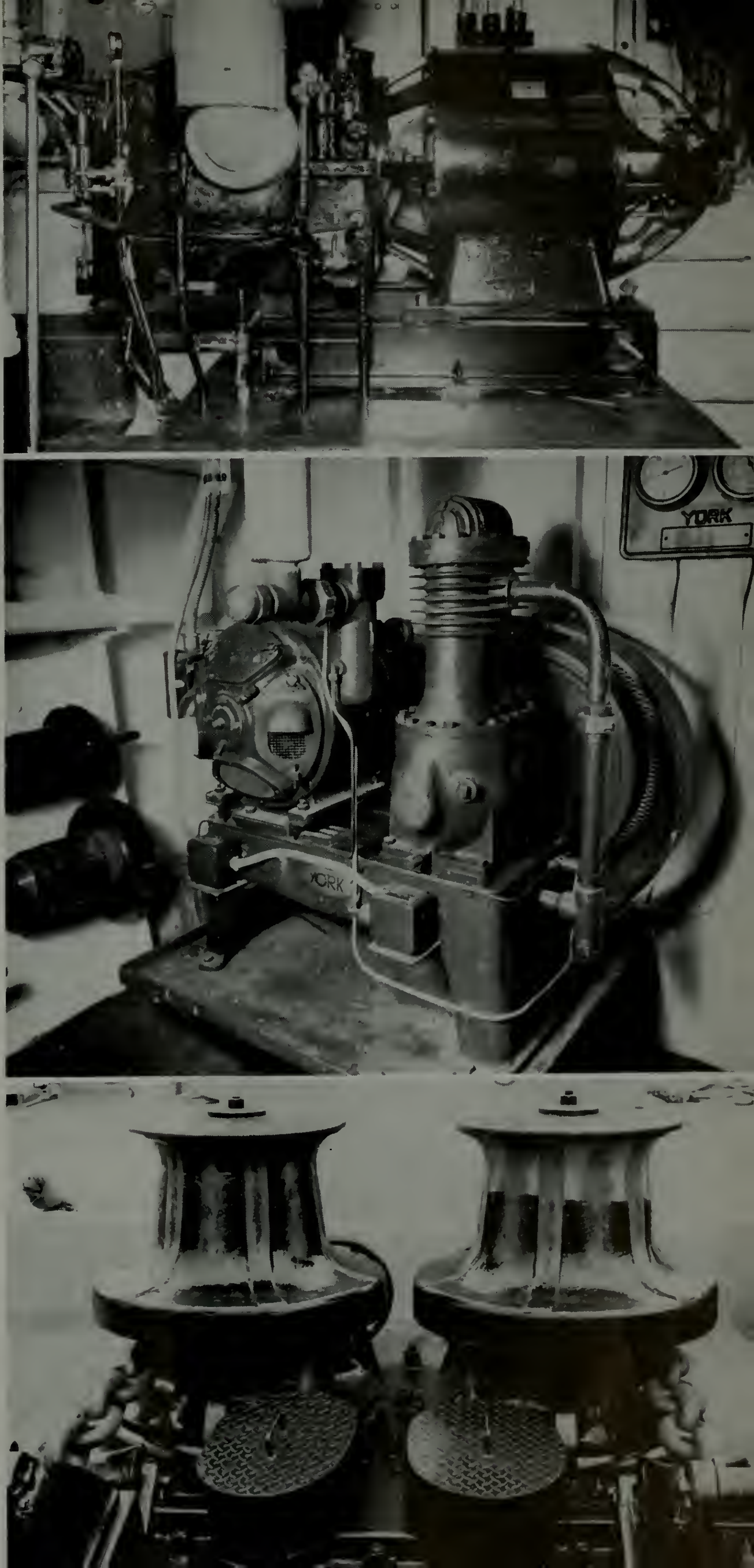
In the raised portion of the upper deck, forward, is crew's space for 20 men, immediately aft of the engine room containing the Markey windlass machinery. A crew's messroom and pantry, completely equipped, is located on one side, and the petty officers' mess on the other, which

also includes a separate pantry. Where the forward raised deck breaks to form the boat deck, the deckhouse contains a large galley, furnished with completely-equipped Monel-metal-covered work tables, and equipped with a G. E. service refrigerator, a Buell flat-top oil-burning range, a "Steam Chef" autoclave, Green-Winkler coffee urns, and other items. Aft of the galley is a large ward room and pantry, and at the aft end of the deckhouse a large plotting room.

On the bridge deck are the pilot house, the chart room and the roomy captain's quarters, with ship's office, bedroom, bath and fully-equipped pantry. Aft of this space is the compartment within the lower smokestack containing the two Sturtevant induced draft fans for the boilers.

The fleet of special workboats, all built at the Puget Sound Navy Yard, at Bremerton, comprise several types especially suited for certain kinds of work. The main fleet consists of four heavy 30-foot power launches, equipped with 30-horsepower Buda diesel engines, Exide 24-volt battery, and survey facilities. Two launches are carried on heavy davits on each side of the upper deck. Two 24-foot power whaleboats, equipped with Redwing gasoline engines, two non-magnetic whaleboats and a fleet of six 16- and 20-foot skiffs and dories are also carried, making a total of sixteen workboats piled on the decks. A group of Johnson outboard motors powers the skiffs and dories. Two Harvey portable (Radio Laboratory, Cambridge, Mass.) two-way radiophone sets are supplied for use by the power boats.

Crane plumbing fixtures and general service piping is fitted throughout the vessel. Six specially-designed air heaters, with two sets of steam coils, Sylphon valves and Johnson System temperature controls, heat the entire ship through directional diffusers in each compartment or room. Arofin fans are used; also Powers regulating valves, operated by the Johnson control. Jamison steel doors are fitted throughout the ship. Kearfott windows with special stainless steel exterior trim are fitted throughout all the upper deck areas, including the pilot house. All lockers, berths, tables and chairs are of fireproof construction, and an un-



Top to bottom: Steam turbine electric generating set; motor-drive compressor of refrigerating machinery; double windlass with vertical shaft wildcats and gypsey heads.

usually large number of complete bathrooms, including showers, toilets and basins are fitted conveniently throughout the ship. A General Electric drinking fountain is fitted in the engine room. Every care has been taken with lighting, to assure ample illumination in all quarters. Most of the fixtures are waterproof, and all wiring is of Navy-type steel-sheathed cable.

Propulsion Machinery

Steam for the propulsion and the auxiliary machinery of the Explorer is generated in two Babcock & Wilcox water tube boilers of the latest marine type. These boilers are designed for working pressure of 350 p.s.i. and for 200 degrees F. superheat, and deliver steam to the throttle of the main turbine at 300 p.s.i. and 200 degrees F. superheat.

The boilers operate on oil fuel with an induced draft system using Sturtevant blowers. Fire room equipment includes Wager smoke indicators, Brown CO_2 indicators and stack pyrometers, Sperry salinometers, a Marsh recording steam pressure gage, and a Tagliabue steam gage. All of these instruments are visibly readable at the main control stand in the engine room.

A No. 2½ heavy duty, vertical, gear in head type, steel casing Quimby screw pump is installed for fuel oil service. This pump is driven directly by a 3-H.P., 575-1150 r.p.m., variable-speed motor, and has a capacity of from 1-6 g.p.m. of fuel oil at pressures varying from 150-300 p.s.i. The Quimby Pump Company also furnished for lubricating oil service two of their No. 2½B vertical gear in head type steel cylinder Rotex pumps, each connected directly to a 5-H.P., 1150 r.p.m., constant-speed motor, and each having a capacity of 100 g.p.m. of lubricating oil at 40 p.s.i.

The main propulsion engine is a DeLaval double reduction gear steam turbine. This turbine normally develops 2,000 S. H. P. at 130 r.p.m. propeller speed, using steam at 300 p.s.i. gage with 200 degrees F. superheat and exhausting to a 28-inch vacuum. It is also designed to develop 100 per cent of the normal ahead power when running astern, with 130 per cent of normal ahead steam flow. The gears are of the double reduction type, to give the propeller speed of 130 r.p.m.

The turbine has four elements for ahead operation, and the astern blading is in one piece with the buckets of the last two ahead rows, the inner portion of each bucket being for ahead propulsion and the outer portion for backing.

All turbine casings and nozzle, boxes and other parts coming into contact with high-temperature steam are of steel suitable to the steam temperature. The casings are divided at the horizontal center plane and are suitably supported to allow for expansion without distortion. All pockets are drained to the condenser to prevent accumulation of water.

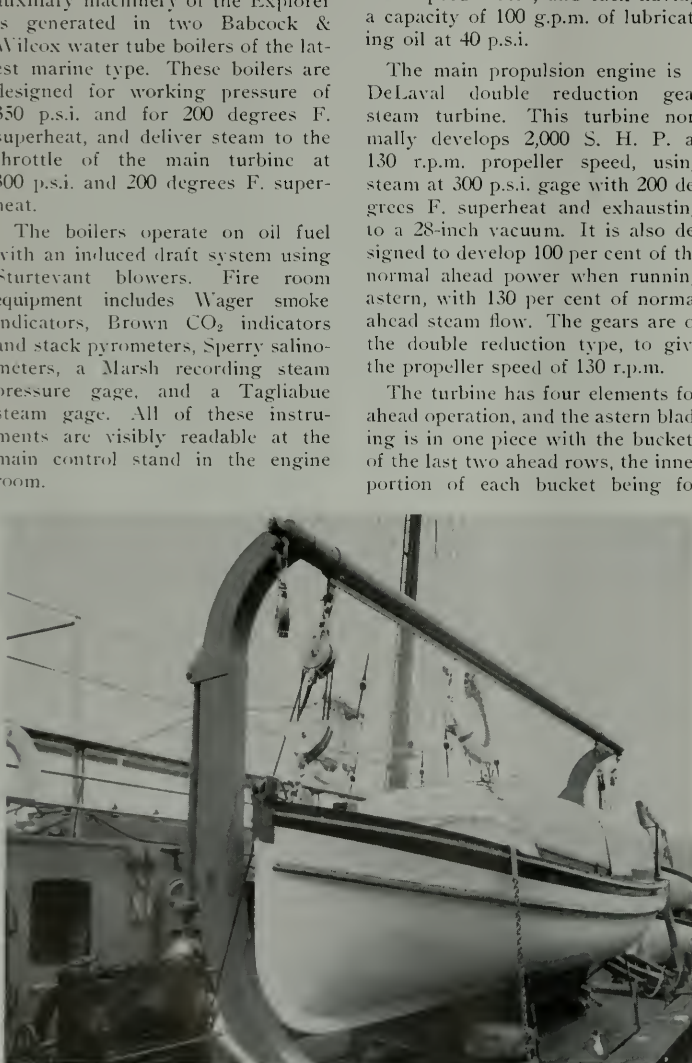
The two reductions of the double helical gear are mounted in a single gear case of welded steel construction, stiffened to insure rigid support of the moving parts, and split so as to make bearings and rotating parts readily accessible, in addition to which there are suitable manholes and handholes.

The pinions are made of heat-treated, high-carbon steel forgings. The gear wheel centers are of cast construction, mounted on a steel shaft, and the rim is of steel. The bearings are of genuine babbitt in split cast iron shells. All moving parts, such as gear teeth and journals, are flooded with an ample supply of oil.

The main propeller thrust bearing is of the pivoted, segmental, six-shoe marine-type, and is located in the forward end of, and incorporated in the design of, the low-speed gear casing, with particularly rigid attachment to the foundation. A motor-driven turning gear capable of turning the propeller shaft and connected parts through one complete turn in eight minutes is attached to one of the slow-speed pinions.

This propelling unit has been designed particularly for ruggedness, reliability and ease of maneuvering, and is very similar to, although of slightly greater horsepower than the propelling units built by the DeLaval Steam Turbine Company for the successful Coast Guard cutters Escanaba, Tahoma and Onondaga. The units for the latter vessels were each rated at 1,500 H. P. at 140 r.p.m. propeller speed, and were supplied with steam at 340-pound pressure and 200 degree F. superheat.

The gears and turbine are protected by an automatic hydraulically-operated steam cut-off valve



One of the special survey power launches.

Above: The captain's room and the wardroom. Johns Manville "Flexite" walls and ceiling, rubber tile flooring, "Good Form" tubular aluminum furniture. At bottom of page: The galley, a pantry and refrigerating chamber. Note lavish use of Monel metal. The windows are Kearfott.

energized from the turbine-gear oil pressure system.

The steam condensing equipment was furnished by the Condenser Service and Engineering Co., Inc., of Hoboken, N. J.

The main condenser contains 1,300 square feet of effective condensing surface, made up of 70-30 per cent cupro-nickel tubes ¾" O.D., 18 B.W.G., 8' 6" effective length. The water circuit is single pass. The condenser is located athwartship. It is connected to the turbine exhaust flange through a special steel diaphragm so designed as to insure that there will be no dangerous distortion of the condenser during maneuvering.

The unit is designed to handle all the steam of the main turbine when it is developing full power ahead, and to maintain a vacuum of 28" referred to a 30" barometer when supplied with 5,200 g.p.m. of circulating water at 70 degrees F. The design is based upon a tube cleanliness factor of 85 per cent.

A Warren centrifugal pump driven by an Elliott steam turbine supplies this circulating water.

A hotwell of liberal storage capacity is welded directly to the bottom of the condenser. It is of the deaerating type, the condensate produced in the condenser having at all times an oxygen content not exceeding .03 cc per liter.

The condenser has a shell constructed of rolled steel, boiler plate quality. It is welded throughout, suitably reinforced and stiffened. Tube sheets are of rolled Muntz metal. Support plates are rolled steel. Water boxes are of cast iron.

Tubes are rolled into serrated tube holes at the inlet end and packed with Anchor metallic packing at the discharge end. These tubes are arranged with graduated spacing, being located at wide centers in the upper portion of the tube bank with a gradually reduced pitch towards the bottom to compensate for the shrinkage in volume of the steam as it condenses in passing through the tube bank. Condensate is handled by two Warren electric drive pumps.

A generously-proportioned steam space is provided above the top row of tubes in the condenser shell to allow for adequate lengthwise steam distribution before condensation begins.

An external air cooler with correctly proportioned flow areas in the vapor circuit has been provided to insure a thorough devaporization and concentration of the air before it reaches the vacuum pump suction. This cooler contains 100 square feet of effective cooling surface, which is made up of ¾" O.D. 70-30 per cent cupro-nickel tubes.

For removal of air and associated vapors, a Condenser Service and Engineering Co. twin-element, two-stage steam jet air ejector with combined surface type inter and after condenser has been provided. Each element has sufficient capacity to remove all the air and associated vapors from the condenser under normal operating conditions. Steam for the ejectors is provided at 175 pounds gage pressure.

The inter and after condensers are arranged for the flow of condensate as the condensing medium for propelling steam. The inter and after condenser shell is steel plate; tube sheets, rolled Muntz metal. Tubes are seamless Admiralty metal.

The auxiliary condenser has 330 square feet of effective condensing surface, made up of ¾" O.D., 18 B.W.G., 70-30 per cent cupro-nickel tubes, 7' 3" long. It is designed to handle 4,000 pounds per hour of auxiliary steam, maintaining a vacuum

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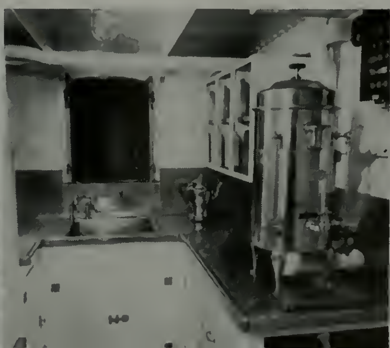
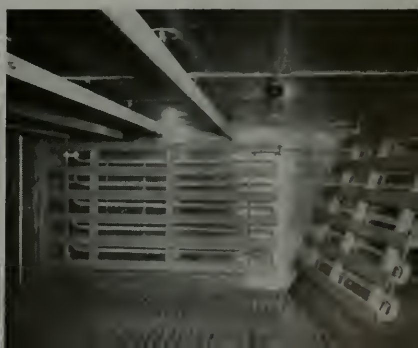




New Bulk Oil Tanker

Second Unit of the Replacement
The Union Oil Company of
By Shipbuilding Division

PRINCIPAL CHARACTERISTICS

Length overall	463'-0"
Length between perpendiculars	442'-0"
Breadth, molded	64'-0"
Gross tonnage	8,066 Tons
Net tonnage	4,814 Tons
Cargo capacity, 98% full	101,400 Bbls.
Fuel capacity, 98% full	10,500 Bbls.
Fresh water capacity	119 Tons
Speed, loaded, on trial	13 Knots
Cruising distance	20,000 Miles
Depth, molded to upper deck at side amidships	34'-10"
Designed loaded draft, molded	28'-4"
Displacement, molded, at designed loaded draft	16,970 Tons
Deadweight at designed loaded draft	13,000 Tons
Normal crew	37

On March 24, just a year to the day after the initial entry to her home port of the Union Oil tanker L. P. St. Clair, a new sister ship, named Victor H. Kelly, in honor of the Vice President and Director of Sales, arrived at Los Angeles harbor. This vessel is the second unit in a replacement program initiated by the Union Oil Company in 1938.

A third unit of this program is on order with Bethlehem for delivery some time in 1941. This tanker will be christened Paul M. Gregg in honor of the Vice President and Counsel of the Union Oil Company.

All of these vessels are identical, and are being built on the Bethlehem-Frear fluted-bulkhead longitudinal-framing system of tanker hull construction under the American Bureau of Shipping special survey and classification for carrying in bulk petroleum products with a flash point below 150° F. They also meet all the requirements of the General Rules and Regulations and the Load Line Regulations of the Bureau of Marine Inspection and Navigation. The design is also in strict conformity with, and has passed all the regulations of, the Panama Canal and Suez Canal authorities for carriage of bulk petroleum products and for the transport and handling of all grades of special hazardous and dangerous petroleum products, including Grade A Panama Canal Classification.

The principal characteristics are shown in the table herewith.

The new Union Oil Company tanker was launched in January at Sparrows Point, Maryland. Mrs. Alice M. Persons (left) christens the vessel in honor of her father, Victor H. Kelly, vice president and Director of Sales.

Safety Features

Safety is of paramount importance when handling petroleum and its distillates, and the tanker Victor H. Kelly is equipped with proved devices for insuring safety.

In order to maintain predetermined vacuum and pressure in the vapor space above the cargo in the various compartments of their ship, the Union Oil Company has installed in the vent piping of each compartment a 4-inch flanged all-brass Shand & Jurs Vacuum and Pressure Cargo Breather Valve. The use of this valve constitutes a considerable safety factor in that the fitting, being of all-bronze construction, is entirely spark proof and it is completely vapor tight. It also embodies a non-sticking material which is used in the form of a ring to con-

Victor H. Kelly

Program of California Delivered of Bethlehem Steel Co., Ltd.

tact the valve seats, insuring vapor tightness at all times. Adjustment for varying load requirements is provided, as well as means for locking the pressure pallet in an open position. This feature is particularly important when a flue gas system is used.

The engine and boiler room spaces are protected against fire by the Lux carbon dioxide system. Twenty-six 50-pound capacity Lux cylinders are conveniently stowed in the steering gear space. The controls for operation are in the crew passage convenient to an exit from the spaces protected.

Cargo oil tanks are protected by a Union Oil Company system of flue gas coverage. In this system the flue gases are washed and cooled and used to fill the ullage spaces at the top of the oil tanks.

Navigation and Communication

Mackay Radio and Telegraph Company furnished the radio equipment for this tanker. In the radio room is a 200 watt intermediate frequency transmitter, a 200 watt high frequency (short wave) transmitter, a 50 watt emergency transmitter, and receiving equipment consisting of one all-wave main receiver, one standby intermediate frequency receiver and a crystal receiver. Also in the radio room there is a panel in which are mounted the Mackay radio auto alarm, power supply and main feeder switch boxes and control units. All wiring was installed in deck and deckhead channels with the bulkheads left entirely free and clear.

Mackay Radio also supplied a type 105-A Kolster Radio Direction Finder, which is installed in the chart room.

The navigation equipment is very complete, including: Sperry Gyroscopic master compass and three repeaters; Sperry course recorder; Sperry Gyro Pilot; Submarine Signal Company Fathometer; and an electric sounding machine.

Naco cast steel stud link anchor chain was furnished by the National Malleable & Steel Castings Company.

Leslie "Tyfon" whistles were installed, and Leslie automatic control for fog signaling.

Steam Generating Plant

Steam is supplied by two Foster Wheeler "D"-Type water tube boilers, each with a heating surface of 4928 square feet and each having an evaporating capacity to produce 24,500 pounds per hour of steam at 400 pounds pressure and 750 deg. F. total temperature. These steam generators have built-in economizers, superheaters and desuperheaters.

Each boiler is equipped with eight soot blowers of the full automatic valve in the head type, supplied by the Vulcan Soot Blower Corporation. Steam pressure of each blower may be regulated according to the cleaning requirements through an exterior adjustment on the head of the blower.

A Wager Smoke Indicator is fitted to each boiler. These indicators are of the periscope type and are so arranged that smoke conditions in both uptakes can be observed from one position in the fire room.

The boilers are mounted on a flat above and aft of the turbines. The arrangement is fore and aft, with the drums athwartship and the firing fronts on the starboard side. Three Todd Hex-Press model forced-draft double-casing type air registers and oil burners fire the furnace in each boiler.

Combustion in these furnaces is supervised by the Hagan Automatic Combustion Control, which has received widespread approval from both designers and operators in the marine field. Being fully automatic, of rugged design, without any parts subjected to excessive wear, the control maintains constant steam pressure and correct fuel-air ratio, thereby maintaining proper combustion at all times. This proper combustion eliminates smoke and reduces soot and furnace maintenance.

During the builders' trials the conditioning of boiler water was under the supervision of a Bull & Roberts service engineer, using the Hall System of Boiler Water Conditioning. The vessel's engineers having been instructed in the proper way to handle boiler water, they are able to maintain efficient operation by preventing the development of scale and corrosion.

Two Northern rotary motor drive fuel oil service pumps and two fuel oil heaters serve the boiler furnaces, one of each having capacity to take care of full requirements for both boilers. A Worthington horizontal duplex steam pump acts as standby.

Propulsion Machinery

A set of Bethlehem cross-compound double reduction geared turbines drive the single screw. These turbines were designed and built at the Fore River yard of the Shipbuilding Division of the Bethlehem Steel Company. The set is designed to deliver 3,500 normal horsepower with the propeller shaft turning 85 r.p.m. under steam throttle conditions of 375 lbs. pressure, 725° F. temperature, and a vacuum at exhaust flange of 28¼ inch Hg. Under these conditions, the high-pressure rotor (of the combined impulse and reaction type) turns 5,500 r.p.m., and the low-pressure rotor (of the single-flow reaction type) turns 3,500 r.p.m. The propeller is 18 feet, 6 inches in diameter, of 15 feet, 3 inches pitch, and is designed to drive the fully-loaded hull at 13 knots when turning 85 r.p.m.

An astern turbine with sufficient capacity for good maneuvering ability is fitted in the low-pressure ahead turbine casing.

The low-pressure turbine exhausts directly into the main condenser, which, together with the auxiliary condenser, is also of Bethlehem design and construction.

Under normal sea operation the main condenser handles all exhaust steam, the auxiliary exhaust being admitted through an automatic exhaust back-pressure valve. The auxiliary condenser is normally used only in port, and handles the steam from the turbo generating sets and from auxiliaries.

The reduction gears are of Falk manufacture, and the gear case houses also the Kingsbury thrust bearing for the propeller shaft and a reversible motor drive turning gear.

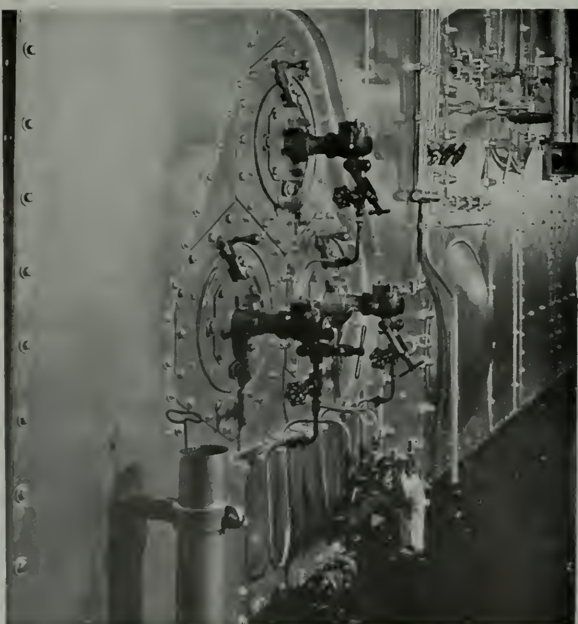
The lubricating oil system is of the gravity type, served by one Northern rotary motor-driven oil pump drawing oil from the sump and discharging into the oil supply line (which is kept under constant pressure by a gravity tank) through an oil cooler. The tanks and coolers are installed in duplicate, one being a standby. A Worthington vertical simplex pump, steam driven, is installed as a standby service pump. A De Laval Uni-Matic purifier with a separate steam heater and with a capacity of 150 gallons an hour keeps the lubricating oil in good condition by either continuous or batch operation.

Steam Driven Auxiliaries

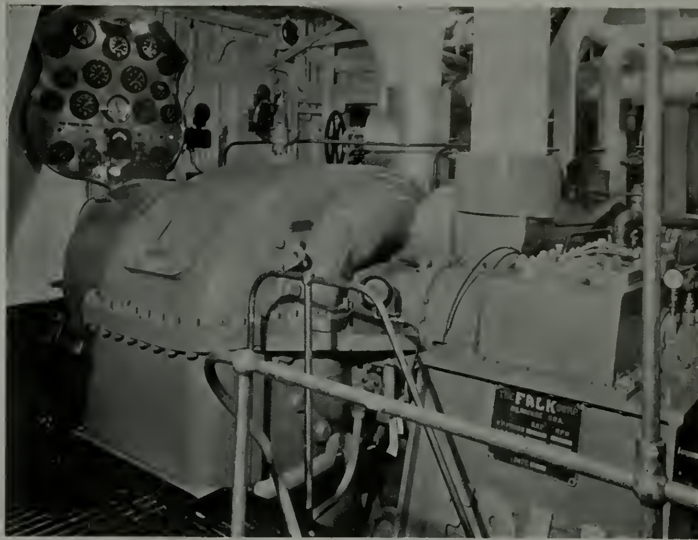
The two main feed pumps are Worthington centrifugals directly coupled to Sturtevant turbines, and one Worthington reciprocating steam drive standby feed pump is installed for emergencies. Each main pump will deliver water enough for simultaneous overload operation of both boilers.

The cargo pumps are Kinney Heliquads driven by Whitton steam turbines. There are four of these pumps, three main and one stripper. Each main pump has a capacity of 3,000 barrels per hour and the stripper pumps 500 barrels per hour. A very flexible piping arrangement designed by the technical staff of the Union Oil Company enables these pumps to handle three diffierent oil products simultaneously without mixing. The pump room is ventilated by an American Blower fan driven by a Coppus steam turbine.

Two Westinghouse 240 volt D.C. steam turbo reduction geared generating sets supply electric power for the ship, which is distributed through a Westinghouse switchboard. 120-volt current for lighting circuits is supplied by two General Electric motor generators.



Two views in the fire room, showing the fronts of the Foster Wheeler steam generators.



Bethlehem main propulsion turbine and Falk speed reducing gear.

The American Engineering Company supplied steam deck auxiliaries, including four capstans, two cargo winches, two large warping winches one windlass and the steering gear.

General Service Auxiliaries

Worthington supplied all general pumping equipment including one centrifugal fire pump driven by a Superior diesel engine, one centrifugal motor-driven general service and ballast pump, and one motor-driven centrifugal sanitary pump, two motor-driven plunger units for potable water and wash water hydro-pneumatic service, one horizontal duplex steam-driven general service and ballast pump, and horizontal duplex steam-driven evaporator feed pump, and a vertical duplex steam-driven fire, bilge and ballast pump.

A Davis Engineering Company 15-ton capacity evaporator and a distiller of the same make and capacity will be fitted in the engine room and arranged for making potable water from sea water and for pre-evaporation of raw feed water. Davis Engineering Company supplied also the fuel oil and lube oil heaters and the lube oil coolers.

Compressed air for automatic controls, air-operated tools and other miscellaneous services is supplied from an air receiver charged by a Worthington motor-driven compressor with a standby connection from a Westinghouse steam-driven compressor.

Refrigeration spaces for food storage are cooled by a Carrier Brunswick direct expansion ammonia plant. This plant is designed to maintain suitable storage temperatures in the ship's stores, refrigerators, and to cool drinking water for crew.

Paint is an important item in the maintenance program of a tanker. On the Victor H. Kelly the painting of the interior living quarters has been harmoniously carried out in "Dulux," supplied by du Pont. The walls of dining room and officers' quarters are in French gray with a trim of sandstone color. The ceilings are in flat white, producing a maximum of light diffusion with minimum glare.

The superstructure exterior is in "Dulux" Spar Gray. The hull above the waterline is in black with a five-foot band of "Dulux" Spar Gray encircling the boat just below the deck.

Super - Distance Atlantic Flyers

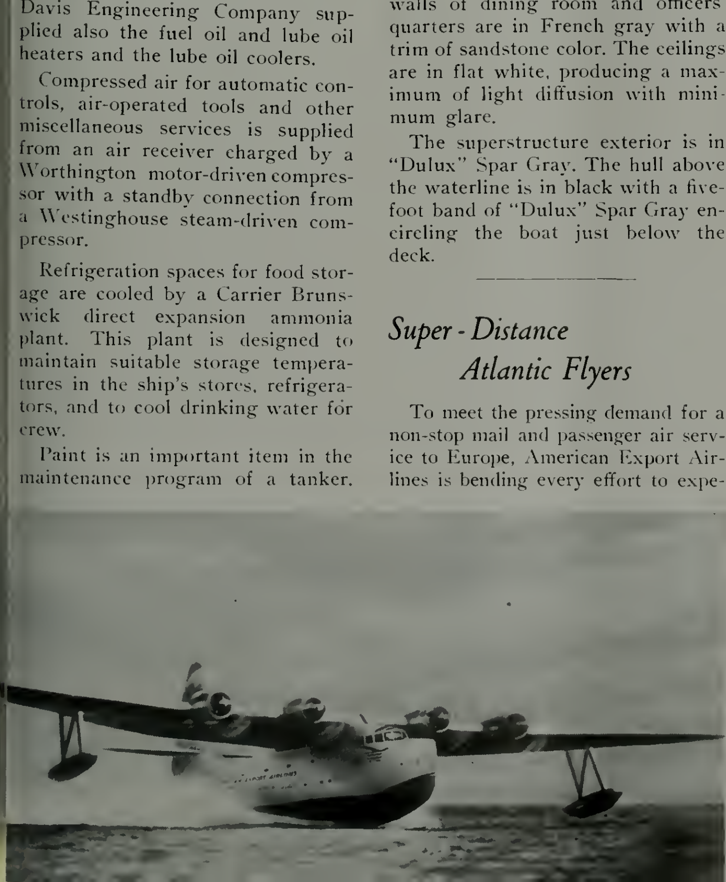
To meet the pressing demand for a non-stop mail and passenger air service to Europe, American Export Airlines is bending every effort to expedite the delivery of its fleet of giant long-range Flyers, which are under contract with the United Aircraft Corporation.

The flying boats will be of the same fundamental design as the Sikorsky Dreadnaught built for the United States Navy and shown herewith. The picture is from an actual photograph of the Navy's Flying Dreadnaught, on which an artist has depicted the exterior changes for commercial operation.

Henry Dreyfuss, noted industrial designer, has been retained by the airline in a consulting capacity, and will work with United Aircraft, the builders, on interior design and refinements, in order to insure maximum passenger comfort.

American Export's new Flyers are guaranteed by United Aircraft to be capable of flying the Atlantic non-stop with adequate fuel reserves and substantial payload. The phenomenal long-range ability of these flying boats will make it possible for American Export Airlines to eliminate the hazards and delays occasioned by intermediate stops, such as Bermuda and the Azores, and thereby insure dependability of schedule.

These ships will make possible the regular and fast mail and passenger service to three neutral countries in Europe Portugal, Spain and Italy.



A Practical High-Pressure Feed System For Marine Steam Power Plants

Steam turbine economy is almost wholly dependent on a good supply of properly-conditioned steam, and one of the major factors in producing such a supply of steam is the system for moving and treating the condensate and the feed water.

The following description shows the mechanics of movement and the methods of treating this factor, as applied on the new high-pressure steam tankers of the Standard Oil Company of New Jersey, which currently operates the largest fleet of such tankers—a fleet having an excellent record for fuel economy.

Two main two-stage condensate pumps draw from the main and auxiliary condensers. The auxiliary two-stage condensate pump draws from the auxiliary condenser.

All the condensate pumps discharge through their attendant appurtenances (air ejectors, grease extractors, feed heater drain cooler and 30-lb. absolute 1st stage feed heater) to the surge tank, which is located on the forward bulkhead or engine room casing at an elevation not less than 45 feet above the turbine-driven feed pumps. The condensate leaves the 1st stage feed heater at about 240° F.

The main and auxiliary feed pumps draw from the surge tank and discharge through both the main and auxiliary feed lines and the second stage (85 lbs. absolute) feed heater, or economizers, to the boilers. The feed heaters and drain cooler are provided with by-pass valves, arranged in the piping so that the feed heaters and drain cooler may be cut out for repairs without shutting down the main propulsion units or the turbo generators.

The feed water regulators regulate the speed of the main feed pumps and the supply of feed water to the boilers by means of a diaphragm-operated valve fitted in the steam line to the main feed pumps. The diaphragm valve is actuated by compressed air.

The auxiliary exhaust main receives: the exhaust from all non-condensing auxiliaries in the machinery compartment; bleeder steam (through pressure-regulating valve and a non-chattering type, non-return valve) from the main turbines; the make-up vapor from the evaporator; and the exhaust from cargo pumps. This auxiliary exhaust main supplies heating steam to the 1st stage (30 lbs. absolute) feed heater shell. Excess pressure protection is obtained through back pressure valves fitted in the auxiliary exhaust main connections to the main and auxiliary condensers. Emergency atmospheric exhaust is through an escape pipe led up the stack and independent from the boiler safety valve escape pipe. This atmospheric exhaust is provided with a spring-loaded stop valve arranged for convenient operation from the main operating platform. Section-isolating valves are provided to permit of the overhauling of each auxiliary unit without being affected by or affecting the operation of any other auxiliary unit.

The generator turbines are provided with exhaust connection to the auxiliary and main condensers. These turbines are also provided with a 6-in. diameter connection to the atmosphere. The exhausts from steam pumps in the pump rooms, the windlass and the forward winches are combined and led to the auxiliary exhaust main (in the engine room) adjacent to the condensers. The exhaust from the aft winch is led in an independent line to exhaust main in engine room at main condenser.

A connection (with reducing valve set at 12 lbs.) is provided from the 70-lb. gage auxiliary steam line to the auxiliary exhaust line. This supply of 12 lbs. reduced steam is for feed heating when the supply of exhaust or bled steam is inadequate.

Oil catchers are provided in the exhaust lines from: the steering engine; the deck machinery; the steam-actuated cargo pumps; and the steam-actuated machinery spaces reciprocating pumps.

When a steam-actuated steering gear is provided, its exhaust is a separate line led to the engine room exhaust main and to the main condensers through a pressure-control valve set at 2 lbs. gage.

The auxiliary condenser air ejector is constructed with two complete sets of two-stage nozzles; one set is to be made to operate with steam at 190 lbs. (absolute), and the other set to operate with 105 lbs. (absolute) saturated shore steam.

A horizontal cylindrical steel tank forms the surge chamber. This tank serves as a reservoir between the condensate pump discharge and feed pump suction. The working pressure in the surge tank is about 23 lbs. (absolute), to correspond with the feed water temperature.

In order to remove all oxygen from the feed water, the condensate is sprayed into the surge tank through suitable spray valves or internal perforated spray pipes, so arranged that the condensate is sprayed against a group of steam coils fitted within the top portion of the tank. A heater coil is also fitted in the lower portion of this tank. Coil returns are trap-controlled.

Any air liberated in the surge tank is led back to the main or auxiliary condenser or the after condenser, through a line controlled by a needle valve, which is located at the operating platform. The discharge capacity of the surge tank is sufficient to return the boiler water level to normal operating level after a shut-down. The tank is provided with two automatic floats; one float is arranged for actuating the make-up feed valve to the main or auxiliary condenser (so as to maintain automatically the desired level of water in the surge tank); the other float is arranged to control the surge tank overflow.

A distant reading water level indicator is provided at the operating platform for the surge tank. The surge tank is provided with gage glasses, pressure gages, thermometers, including distant reading thermometer at operating platform, vacuum breaker and sylphon vent. The tank is effectively insulated and provided with manhole access ladders and gratings.

The steam to surge tank coils is taken from the 120 lbs. gage steam line adjacent to the deck steam shut-off valves. The deck steam shut-off valves have Stellite metal trim on seats and disks.

The feed water drain cooler is a horizontal shell and tube cooler capable of cooling the feed water drains for maximum power from about 185° F. to 110° F. when supplied with the condensate at 95° F.

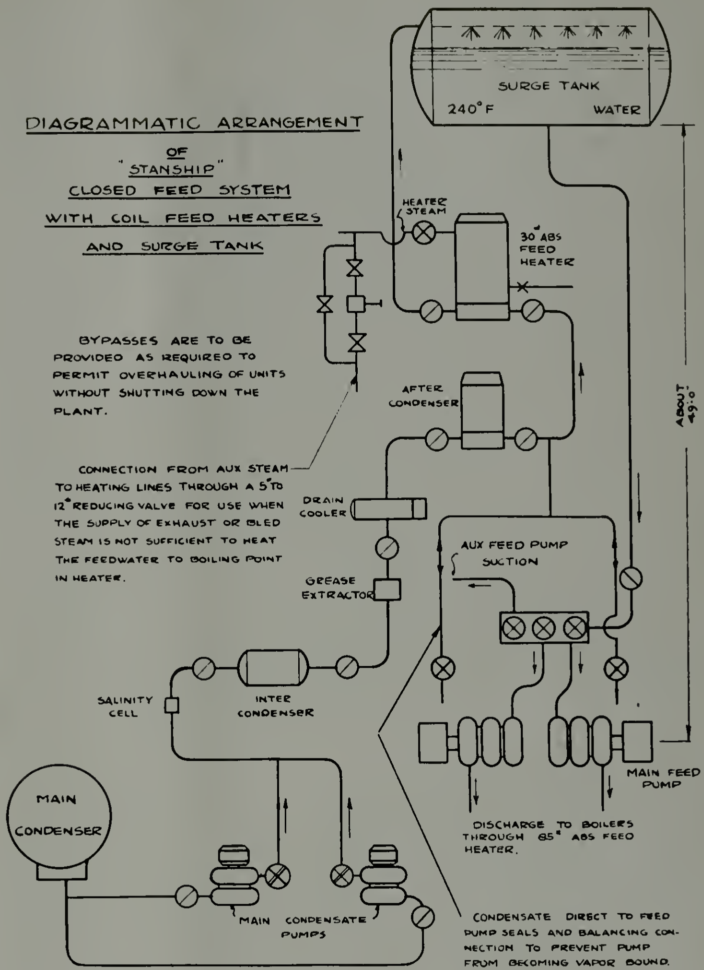
There are two welded steel cylindrical distilled water tanks, each of 10 tons capacity, located under the boiler flat.

The 1st stage feed heater heats the condensate (obtaining under conditions of maximum power plant operation) from 100° F. to 240° F. when the heaters are supplied with exhaust and bled steam at 30 lbs. absolute. The 2nd stage feed water heater when fitted is capable of heating maximum power condensate from 235° F. to 300° F. when supplied with bled steam at 85 lbs. absolute.

The feed water heaters and drain cooler are located in the engine room on the forward bulkhead, or casing sides, at elevations which will permit of gravity flow of drain water (in the reverse direction of the feed water being heated) from the 2nd stage heater to the drain cooler.

The drains from each heater and the drain cooler are controlled by an external float controller arranged within piping leading from the feed heater. The drain piping is arranged with suitable by-passes so that any unit can be overhauled without being affected by or affecting the operation of any of the other units. The feed water heater drains are led to the main and auxiliary condenser through grease extractors, and are float-controlled in such a manner that the drain cooler is always submerged.

There is a welded steel cylindrical atmospheric drain tank (of about 150 gallons capacity) arranged to receive the drains from: the evaporator trap; the ship's heating system trap; the inspection tank; the after condenser; and the various steam lines. The flow of water (direct and through the drain cooler) from the tank to both condensers is controlled by means of a float-type regulator. The tank is vented to the after condenser, and is to be fully insulated.



An inspection tank is provided to take the returns from the heating coils and from the fuel and lubricating oil heaters. The drains from the fuel oil heaters are cooled (by means of sea water in a tube and shell type cooler) before entering the inspection tank.

Provision is made for by-passing the lubricating heater drains around the drain cooler.

The tank is fitted with a scum pan and baffles. The last compartment of the inspection tank contains a fiber filtering material. The after air ejector condenser is combined (in a common shell) with the gland seal exhauster condenser.

Duplex grease extractors are provided in the low-pressure feed line (ahead of the drain cooler) and in the feed water drain line (after the drain cooler).

Condensate recirculating lines are provided around the air ejector condensers and from the main feed pumps to the condensate pump discharge line to the surge tank. The recirculating control valves are located, for their convenient operation, at the operating platform.

Propellers For Largest *American* Merchant Vessel

Cramp Brass and Iron Foundries Co., a subsidiary of the Baldwin Locomotive Works, is justly proud that its foundry was selected to supply the propellers for S.S. America, the new passenger liner of the United States Lines, now nearing completion at the yard of the Newport News Shipbuilding and Dry Dock Company. America is the largest merchant vessel yet built for the American merchant marine, and will be, for a time at least, America's queen of the seas.

She is of twin-screw propulsion, and the normal shaft horsepower of her steam turbine drive is 34,000. Under U. S. Maritime Commission practice, this means a maximum shaft horsepower of at least 42,500, or 21,250 on each screw.

Each of these propellers is a four-bladed screw 20 feet in diameter and cast in one piece of Parson's Manganese Bronze by the Randupson Process. The blades are: of carefully-figured area to transmit the necessary thrust; of nicely-calculated section to absorb the power without undue strain on the metal; and of accurately-designed pitch to obtain the required speed on normal power at 128 r.p.m. of the screw.

When propellers are finished in the Cramp shops they will test within ½ of 1 per cent of the designed pitch.

Thomas A. Short Company of San Francisco has recently been appointed Pacific Coast sales representative for Cramp propellers.

Upper view shows the beautifully-molded stern of S.S. America and her twin four-bladed screws that will drive the huge hull at better than 22 knots.

Lower view is a close-up of one of the solid four-bladed screws 20 feet in diameter.

The New *National Defense Feature Tankers*

The U. S. Maritime Commission expects shortly to issue contracts for the construction of six national defense feature oil tankers similar to six tankers which the Socony-Vacuum Oil Company are now building.

These Socony-Vacuum vessels are part of a U. S. Navy-U. S. Maritime Commission program for the construction of 24 high-speed tankers to be operated in regular service by American private operators, and callable by the Navy in an emergency.

The first group of this program—12 twin-screw tankers built for the Standard Oil Company of New Jersey—is nearing completion. These vessels measure 11,500 gross tonnage and have 13,500 shaft horsepower.

The second group will consist of single-screw tankers with a gross tonnage of about 10,300 tons and 12,000 shaft horsepower.

The design for this second group of tankers was based on that of the tankers Mobilfuel and Mobilube, built for the Socony-Vacuum Oil Company by the Sparrows Point Yard of the Shipbuilding Division of the Bethlehem Steel Company.

The design was prepared under the direction of N. J. Pluymert, naval architect, for Socony-Vacuum Oil Company, using the Bethlehem-Frear fluted bulkhead and longitudinal system of hull construction. The principal characteristics of this size and type of national defense feature tanker are given in the table herewith.

This design is described in a paper on "Modern Tanker Design," read before the 1939 annual meeting of the Society of Naval Architects and Marine Engineers. We quote from this paper:

"The design has reduced the riveting to shell and main deck strake laps only, with the deck longitudinal riveted to avoid overhead welding, and the entire internal structure is welded.

Principal Characteristics

Length over all	500′ 7½″
Length B. P.	487′ 6″
Beam molded	68′ 0″
Depth molded, upper deck	37′ 0″
Draft molded, designed	29′ 8½″
Draft, summer freeboard	30′
Gross measurement	10,300 tons
Total displacement	21,450 tons
Total deadweight	15,900 tons
Tank capacity, 42-gallon barrels	12,900 bbls.
Shaft horsepower	12,000
Speed on trial	16½ knots

Data given in this paper show that a tanker of the same size built several years back employed 1,058,976 rivets and 12,000 feet of welding. The Mobilube used 122,055 rivets and 371,168 feet of welding. (The new tankers will use about 80,000 rivets and 380,000 feet of welding, as the bottom plating is to be entirely welded.)

"A study of corrosion in the various members of the tank structure indicated the advisability of eliminating pockets and horizontal members where corrosion is accelerated by the collection of scale. The Bethlehem-Frear system was developed with the thought in mind of retarding corrosion as well as saving weight by the use of fluted bulkheads.

"The latest design with fluted bulkheads and a major use of welding shows a saving of nearly 1,000 tons in the light weight of the vessel and its consequent increase in deadweight and earning power with a hull structure less liable to rapid deterioration or corrosion. This saving was made by a reduction of 800 tons or 18 per cent in hull steel and 200 tons in machinery. This saving in hull steel was not accomplished by using the minimum of permissible scantlings. The members at the top of the cargo tanks and the horizontal members carrying the maximum of 8/100 inch over classification scantling and the members in the center of the tank are as much as 4/100 inch over the minimum required scantling to allow for corrosion loss.

"In considering new designs of tankers, attention must be given to the maximum use of welding in conjunction with a design of internal structure of the cargo spaces which will eliminate as far as possible horizontal surfaces and pockets, thus reducing corrosion. The type of machinery must be carefully considered for the intended service so that full advantage is taken of the lightest combined weights of machinery and bunkers.

"World tanker construction shows a decided increase in both speed and cargo deadweight in tankers built in recent years. The use of lighter and more efficient machinery and the higher deadweight efficiency of recent welded designs provide for these increases with little change in the principal dimensions of the tanker."

Data with the paper indicate that on regular service Mobilube carries 15,687 tons of cargo at 14 knots on a fuel consumption of 27 tons a day.

On the trials of the Mobilube, the representatives of the Maritime Commission were very much impressed with the design of the tanker and the results obtained. After a conference, it was agreed that the technical staff of Socony-Vacuum would adapt the design to assure 16½ knots sea service speed.

It was figured that this speed would require 12,000 shaft horsepower after the lines at the bow had been fined somewhat to give less resistance without unduly sacrificing cargo capacity.

The Mobilube has 4,400 shaft maximum horsepower, and on her trials made 14 knots speed. The designers were able to get 12,000 shaft

(Page 43, please)

A Busy Pacific Coast Shipyard

The Moore Dry Dock Organization Maintains a Steadily-Increasing Tempo in Ship Construction and Repair Work

The illustration on this page is an aerial view of the Moore Dry Dock Company's shipyard at Oakland, Calif., on a typical March day. This picture is worthy of some study. It shows: two large new cargo vessels under construction at the outfitting dock for machinery installation; two Greek cargo steamers, one alongside a pier, the other on the floating dry-dock; an American intercoastal steamer on another dock; a Danish motorship alongside another pier; a smaller cargo steamer and a tanker spotted at piers, and the hull of a third large cargo steamer rapidly taking shape on the shipbuilding ways.

With all this activity in progress, there is still room for more ships, and the picture shows only a small part of the equipment maintained by this progressive firm. To the right of this area there are numerous and spacious shops equipped with the best of modern tools and appliances for efficient production. These shops include a plate shop with mold loft over, a pipe shop, a machine shop, a boiler shop, a forge shop, a structural steel fabricating shop and an administration building. All the wharves and the building ways are equipped with heavy-lift traveling cranes.

The Carmar, one of the Greek steamers in the illustration, brought a very interesting repair job to the yard.

Loaded with 7,000 tons of scrap iron, she lost her stern post and rudder in a storm about 700 miles north of Honolulu. The story of her struggle with the elements, and the way she was contacted and towed into Honolulu by Young Bros.' tug, Mamo, was told in Pacific Marine Review for March.

A survey revealed the fact that extensive permanent repairs were required, and in her heavily-laden condition there were no facilities available at Honolulu for the purpose. It was therefore determined that she should be sent to San Francisco. This 2,100-mile ocean voyage required some method of steering, and so, under the direction of Thomas C. Warkman, well-known Pacific Coast representative of the Salvage Association, London, she was fitted with a jury rudder. The design of this rudder, proposed by Mr. Warkman and installed under his personal supervision, was unique and entirely successful, and brought the Carmar safely to San Francisco Bay.

Although she was down to deep load line with her heavy cargo, the large floating dock at Moore's easily lifted her displacement weight of 12,250 tons. The broken stern frame was removed and a new stern frame of steel was forged and machined in Moore's shops and installed in her hull, together with a new forged steel rudder frame and plates, and

The yard of Moore Dry Dock Company on March 5, 1940, showing three new C-3 cargo vessels under construction and six merchant ships under repair.

now the Carmar is as good as ever. The pictures on page one of this issue show the nature of this repair much better than words can describe it.

The other two illustrations with this article depict a different, but very important, aspect of life and work at a busy shipyard, and in their own way indicate the great growth of Pacific Coast shipyard business during the past two years.

Industrial amateur athletic sports have become a very potent factor in maintaining morale among the personnel of American manufacturing and mercantile firms. Many associations exist for the purpose of promoting such sports. The Moore Dry Dock tug-of-war team attests the revival of this type of activity in Pacific Coast shipyards.

Tug-of-war team of Moore Dry Dock Company. Left to right: Joseph Pacheco, manager; George Travis, coach; Stanley Martin, Walter Cody, Egan Tymn, Ansel Smith, Gilbert Schuldt, Harry Silvey and Sam Walters.

Perhaps welding, modern methods of handling, and other new techniques, may be lightening the burdens that were borne by old timers in the shipbuilding industry, but this team shows that there are husky lads left in the trade. After a series of strenuous and hard-fought matches, the group shown here has won for the Moore Dry Dock Company the coveted title of tug-of-war champions of California.

The team has been managed by Joseph Pacheco, plate shop foreman, and coached by George Travis, riveter. The latter has developed in his men a high degree of teamwork and coordination which have been responsible in no small measure for the brilliant record that has been made.

For practice the gang finds nothing quite so effective as pulling on a mooring line of a ship made fast at one of the company wharves. This has become their favorite noonhour pastime, and it probably accounts for a good part of their muscular development. The men observe training rules religiously, feeling that the achievement of their objective is abundant justification. A physical examination of the team has shown that their condition is splendid, and they are determined to keep it so. Needless to state, the esprit de corps is excellent.

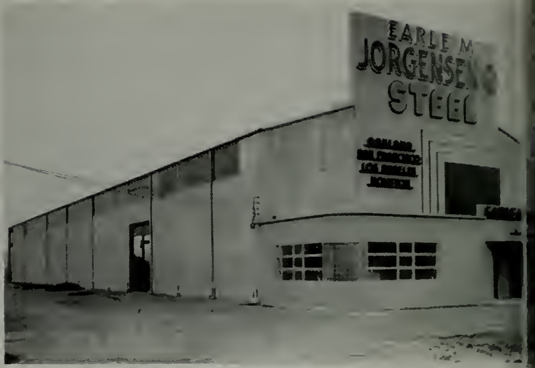
The Moore Dry Dock Company is proud to have such an outstanding group in its employment, and the company is giving the team every encouragement. With continued enthusiasm and perseverence, the men look forward to victory in their matches this year, including a tournament on Treasure Island.

Hawaiian stringed quartette of the employees of the Moore Dry Dock Company. Left to right: Joseph Freitas, Victor Souza, George Otto and Louis Richards.

New techniques in shipbuilding have eliminated much of the noise and clatter of the shipyard, but music still hath charms for the brawny shipbuilders, and so we find in the Moore organization a Hawaiian string quartette, which is achieving quite a reputation for high class entertainment.

Athletic activities, music and shipbuilding blend well in the production of a very high morale. Physical stamina, mental and spiritual uplift tend towards the desire for achievement and the urge to creative ability. The Moore Dry Dock personnel is making records that are drawing the attention of the world's shipbuilders, and it may well be that we need more athletic teams and bands in our shipyards and other industrial plants.

Steel — for the Marine Industries



New Service Facilities for the Bay Region

The shipbuilding and ship repair industries of the San Francisco Bay area have many regular and emergency requirements in steel and steel alloys. In order to better serve these requirements and the increasing needs of their many industrial customers, the Earle M. Jorgensen Company have acquired a 3½-acre site at a strategic location in Oakland, and built a new warehouse for larger stocks of their complete lines in: mild steel bars, shapes, plates and sheets; cold-rolled steels; alloy and tool steels, and special steels.

Founded twelve years ago by Earle M. Jorgensen, this firm started to serve the industries of the San Francisco area from a very small warehouse carrying a very complete line of special steels. The steady growth of the business soon made it necessary to build a large warehouse in Oakland and to establish branches in Los Angeles and in Houston, Texas.

The new Oakland plant occupies a building 80 feet wide by 350 feet long. An electric overhead traveling bridge crane of 5 tons capacity and 80-foot span operates on runways extending the entire length of the building.

This warehouse is equipped with:

Peerless saws for cutting steel stock to required lengths;

A Cincinnati shear, which trims with micrometer accuracy sheets and plates up to ¼" thick and 12 feet wide;

An Airco D. B. flame-cutting machine, using Victor cutting torches and regulators, for cutting heavy plates.

Steel stocked includes all standard sizes: up to 24-inch diameter bars in rounds; up to 20-inch square in billets; down to 30-gage in sheets; and up to 6-inch thickness in plates. All stock is maintained in convenient and orderly stowage racks.

The growing and widespread business of this firm enables them to maintain a large and experienced personnel for the benefit of the customer, and makes it possible in the three warehouses to maintain stocks of such variety and size that they can meet customers' requirements with promptness and certainty.

Jorgensen service also makes available to the customer the advice of trained metallurgists, who will not only assist in the selection of a proper steel, but will follow through in the manufacturing process until the desired results have been assured.

The Oakland personnel of the firm will remain on the job, with Paul Childs as manager of sales and Dave Rodricks as warehouse manager.

Interior of warehouse, featuring neat, orderly stowage of steel stocks. At top of page, an exterior view.

Consolidation of General Engineering & Dry Dock Co.

The General Engineering & Dry Dock Co. of San Francisco was organized in 1921 by George A. Armes, James H. Young and the late J. F. Mooney. At that time the firm acquired the ownership of their present shops in San Francisco. In 1922 they acquired the Barnes & Tibbits Shipyards on the Alameda side of the Oakland estuary, a fine site of 25½ acres with a rail frontage of almost a quarter mile and a water frontage of more than that length. This yard had built many lumber schooners, ferryboats and other craft. Shortly after it came into possession of General Engineering & Dry Dock Co. they built there the Golden Gate type diesel-electric auto ferries, which gave such fine service on the San Francisco-Sausalito and San Francisco-Berkeley routes.

In 1928, General Engineering & Dry Dock Co. purchased the business, land and equipment of the Hanlon Shipbuilding Company in Oakland. This yard had built a number of steel cargo vessels for the United States Shipping Board and was well equipped to build or repair steel hulls. Part of the site was owned by the shipbuilding company and part leased from the City of Oakland.

Here General Engineering & Dry Dock built four fine U. S. Coast Guard cutters and several commercial craft. Here also they completed much notable repair and reconditioning work.

During 1939 the firm decided to give up this Oakland yard, and they are now in process of reconditioning the Alameda yard and moving to that site all usable equipment from the Oakland plant.

Plans call for an expenditure this spring of upwards of $400,000 on changes and betterments. The machine and plate shop is being greatly enlarged. The entire area of the yard will be resurfaced in asphalt and gravel.

George A. Armes, president, General Engineering & Dry Dock Co.

Renovation of the storehouse building has been completed, and a new and larger additional storehouse will be built.

There are two marine railways at the plant. These will be overhauled and their capacity greatly increased.

All the bulkheads and the wharves on the estuary front will be rebuilt, and all pneumatic, hydraulic and electric lines will be overhauled and renewed where necessary.

New buildings to be erected include: a riggers' loft, a marine machinist and dockmen's building, and an administration building with ample space for the executive and sales offices, inspectors' quarters, technical staff offices and drafting room.

The plans contemplate the construction of a $1,000,000 graving dock when conditions warrant that expenditure.

Ship repairs are actively under way at the plant while this reconstruction is in progress. On March 9 the dredger San Pablo, the tug Reliance and a Western Pacific train barge were at the docks undergoing repairs.

It is confidently expected that this plant, with its share of the normal ship repair business, will maintain an average employed personnel of between 150 and 200 men.

General Engineering & Dry Dock Co. is a closed corporation. Its aggressive management is in the hands of its two principal stockholders, George A. Armes, president, and James H. Young, vice-president. P. P. Mesquita is secretary-treasurer, and Frank H. Fox is chief engineer.

Trade Literature

Kennametal Catalog Number 3, a new 32-page practical guide for the care and use of carbide-tipped tools, recently issued by the McKenna Metals Co. This book contains complete descriptions, drawings and recommended uses for standard Kennametal tools and blanks for turning, boring and facing steel and other metals.

Also catalogued are box tools for Warner and Swasey machines, with five sizes listed, as well as several other semi - standard Kennametal-tipped tools. The section on grinding Kennametal is full of helpful information, including instructions on how to avoid grinding cracks. The brazing of tools with Kennametal blanks is completely described and illustrated.

Design 32 Cross-Drum Boiler. Babcock & Wilcox has just issued a 16-page bulletin describing its Design 32 Cross-Drum boiler, a straight-tube, sectional-header unit of moderate cost, for pressures of 250 pounds or less, and with heating surface from 1,000 to 6,000 sq. ft.

In addition to presenting the advantages of this boiler, the text is an interesting discussion of the effect of straight-tube, cross-drum design on the cost of the unit, complete and ready for service; and the ease of inspection, cleaning and similar routine operations. There are also comments on the economics of this design in relation to useful life, tube replacement and inventory of spare tubes.

Three

Geared Diesel Drive

Lighthouse Tenders

The general public has long been familiar with lighthouses, with lightships, and with buoys, fog signals and other aids. Not so familiar, however, are the tenders whose duty is to distribute food, supplies and fuel to lighthouses and lightships; to fuel, repair and adjust the ever-increasing number of automatic or unattended lights; to replace buoys at intervals with reconditioned units, plus a multitude of other jobs too numerous to mention. There are over 30,000 aids to navigation, a large percentage of which require servicing at regular intervals by this fleet of tenders, and it is the responsibility of the marine design division in Washington to furnish designs for seaworthy yet economical ships, correct in every respect for the many peculiarities of service and operation.

Thousands of human lives and millions of dollars worth of shipping depend upon the successful completion of these vessels' daily routine.

At present the following tenders are in active lighthouse service: Forty steam drive, 12 diesel direct drive, 4 diesel-electric drive, 6 diesel-gear drive, or a total of only 64 to perform all of the essential duties outlined.

Dependability and availability come first. Other requirements include: unusual stability, for hoisting buoys over side; minimum draft, for approaching shoals and obstructions; cargo capacity for food, fuel and supplies to be delivered; speed, to respond to emergencies; economy of operation, and ice-breaking ability.

In meeting these requirements for the three latest tenders of the 120-foot class, the designing engineers were faced with the problem of reconciling two opposing demands: correct propeller speed for maximum control and maneuverability at slow speeds, and maximum power with minimum machinery weight, both of these requirements to be met as economically as possible, consistent with satisfactory performance.

The proved economy of marine diesel engines in stop and go, intermittent service gave them preference as main and auxiliary power units. Installation of marine reduction gears permitted the use of relatively light weight, high-speed engines without sacrificing efficient propeller speed. This combination provides ample power within space and weight limitations and guarantees essential maneuverability down to one-third of main propulsion engine speed with satisfactory performance and full control at all times.

Hull Design

The illustrations show clearly the general appearance of these ships. Shell plating is riveted, but all interior framework, bulkheads, longitudinal stiffeners and decks are welded to save weight. Roughly 40 per cent of steel construction is welded to save almost 14 tons, or approximately two and one-half inches of draft. Five transverse, water-tight bulkheads divide each ship into six water-tight compartments, and construction is completely fireproof throughout. A flat-plate keel saves another five inches of draft, and the shell plating is welded instead of flanged to what is virtually an inside stem. To facilitate drydocking and painting, a one- by six-inch steel flat bar is welded flatwise below the

eel plate to provide hull clearance rom the blocks.

The mast forward, on which is tted a ten-ton capacity cargo hoist, s braced by two steel pipe backegs, or struts, welded to the veather deck and masthead. This liminates the necessity for wire ope side rigging and permits a vider horizontal traverse of the oom.

Principal dimensions of the Narissus, Zinnia and Maple are:

L. O. A.	122 feet
Beam	27 feet
Draft	6½ feet
Displacement	342 tons

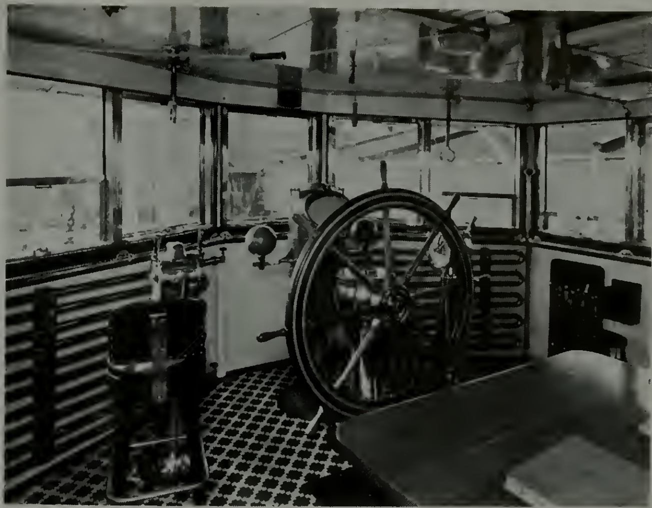
The first two were built by the Mathis Shipbuilding Co., Camden, N. J., for the Norfolk and Jacksonville districts, respectively, and the hird by the Marine Iron and Shipbuilding Co. at Duluth, Minn., for the Cleveland district.

Propulsion Plant

Main propulsion on each of the hree tenders is supplied by twin Superior diesels rated 200 H. P. each at 600 r.p.m., which drive Ferguson propellers through Farrel-Birmingham reduction gears, giving "wheel" speeds of 280 r.p.m. at full engine speed. Superior diesels also drive the two generators sets of 7½ and 10 kw., respectively. Auxiliary equipment is electrically operated throughout, and Exide batteries float on the generator lines. Propeller thrust is taken by a Kingsbury thrust bearing on each shaft, installed aft of the Farrel gear. Main engines operate on closed cooling systems, with Ross heat exchangers installed for this purpose. Both engines are equipped with Alnor pyrometers and Reliance tachometers. Fuel and lubricating oil are centrifuged on the batch system through a Goulds Hydroil purifier. A Wright ½-ton hoist serves for pulling pistons and for other routine maintenance.

These three latest additions to the lighthouse tender fleet represent the latest word in this unique and exacting service. The personnel in charge of design and specifications in Washington are to be congratulated upon the eminently successful shake-down work of these ships. Field reports are unanimous in satisfaction with their performance.

The application of reduction gear drive to this type of service indicates an alert appreciation by the design staff of new possibilities in marine propulsion to maintain and increase a high degree of efficiency. Both the United States Coast Guard and the former Lighthouse Service have earned the admiration and respect of international mariners in years past. As a consolidated unit, they guarantee that American coast and navigable waterway protection will be adequate to meet all emergencies.



Pilot house of Narcissus

New National Defense Tankers

(Continued from page 37)

horsepower on the new tankers in the same dimensions of engine room used on the Mobilube.

Two boilers of sufficient capacity with cross-compound, double-reduction geared turbine developing three times the horsepower of the slower speed design.

The machinery and systems accessory to the power plant requiring increase in capacity and power included: the condenser, circulating pumps and condensate pumps, air ejectors and inter and after condensers, feed pumps and deaerating feed heater, fuel oil and lubricating oil systems, and evaporator plant.

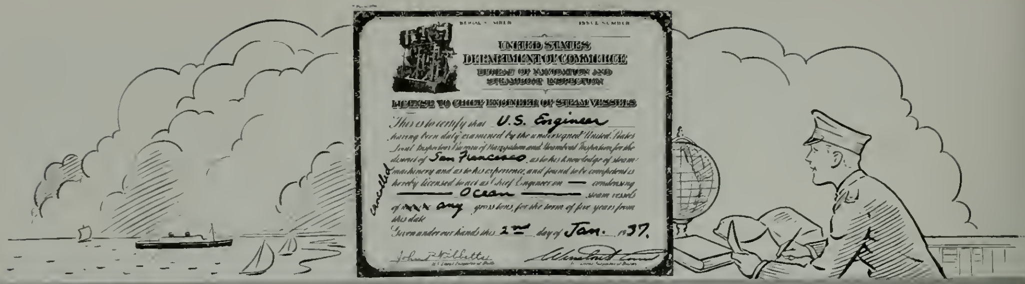
Auxiliary machinery layout and the entire electrical system are to be identical with the Mobilube.

This procedure in design has developed a combination of commercial and national defense types that will be satisfactory as a naval fleet tanker with a minimum sacrifice of commercial features.

The cargo oil pumps installed will discharge the entire cargo of 133,000 barrels of oil in approximately 14 hours.

Trade Literature

Thrustor-Operated Valves, single-leaf bulletin G. E. A. 1569B, issued by the General Electric Company, describing a line of valves designed for operation by General Electric thrustor motors. These valves are available for pipe sizes of 1 inch to 10 inches, inclusive, and in the double-seat balanced or the single-seat unbalanced types. They are built for light duty (125 p. s. i.) or heavy duty (250 p. s. i.), and for temperatures up to 750° F.



Your Problems Answered by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Feed Water Treatment

V: ALKALINITY AND pH VALUES

QUESTION

What is the meaning of the term pH?

ANSWER

It is a sympbol used to represent a rather long and awkward phrase to indicate alkalinity of a solution. The meaning is, "logarithm of the reciprocal of hydrogen ion concentration."

The pH value is a number used to indicate intensity or degree of alkalinity, such that with increasing values of the number the alkalinity increases, and with decreasing values of the number, the alkalinity decreases, and may be so low as to have acid reaction.

The numbers range from 1 to 14, with 7, the mid-point, being neutral, neither acid nor alkali; or, more accurately expressed, as acid as alkali, hence neutral. Thus pH of 9 is more alkali than pH of 8.

QUESTION

What are acidity and alkalinity?

ANSWER

From experiments with electricity flowing through water solutions, the theory of electrolytic dissociation was formulated. The term "ion" is used to refer to atoms of the solution or molecules having an electrical charge. It is because of this charge that we can have batteries, and also that we suffer from the electrolytic currents which corrode or pit our metals.

Hydrogen atoms, when free in solution, carry a positive charge, and are called hydrogen ions, expressed by the symbol $(H)^+$. A molecule of water consists of H_2O, or two atoms of H and one of O. When it loses one atom of H, there is left an OH, which also forms an ion, expressed by the symbol $(OH)^-$, carrying a negative charge.

When the number of (H) ions exactly equals the number of (OH) ions, the solution is neither acid nor alkali, but is neutral.

If the number of (H) ions is greater than the (OH) ions, the solution is acid, and the greater the majority, the more acid the solution.

Conversely, if the (OH) ions exceed the (H) ions in number, the solution is alkaline, and the greater the majority the more alkaline it is. Thus all solutions contain both (H) and (OH) ions, and it is the weight of the majority which determines whether acid or alkaline.

Acid reactions and alkaline reactions are decidedly typical and different. Their effects on chemicals and metals are different. Acids taste sharp or bitter and feel hard to the touch. Alkalies taste different and feel smooth or soapy to the touch. Chemicals are available which change color in the presence of one or the other, giving us a color indicator of acidity or alkalinity.

Thus acidity is the degree of concentration of (H) ions. Alkalinity is the degree of concentration of (OH) ions.

QUESTION

How is the number to represent alkalinity determined?

ANSWER

It has been found that the (H) ion concentration in pure water is .0000001 grams of ionizable hydrogen per 1,000 grams, or liter, of water.

Just as 1,000 can be expressed as 10^3, or 100,000 as 10^5, or .001 as 10^{-3}, and .000001 as 10^{-5}, so the above number is expressed as 10^{-7}. To simplify this expression, we simply use the exponent of 10 and drop the minus sign, and say pH of 7.

Thus pure water having .0000001 grams of ionizable hydrogen per liter has a pH of 7.

The relative concentration of the (OH) ion could also be expressed similarly, but there is no reason for expressing both, so the (H) concentration has been adopted as standard.

It has been found in all water solutions having both (H) and (OH) ions that the more of one, the less of the other; furthermore, that the product of their relative concentrations is a constant. Thus, pure water having equal concentration of both ions, it has .0000001 g.p.l. of (H), or 10^{-7} and .0000001 g.p.l. of (OH), or 10^{-7}. The product of these two numbers is 10^{-14}, since to multiply two numbers we may add their logarithms. A concentration of (H) of 10^{-6} means also a concentration

of the (OH) of 10^{-8}, their product being 10^{-14}.

The lower the concentration of (H), the smaller the number; 10^{-5} has ten times as much (H) as 10^{-6}, and hence is ten times as acid. Thus a pH of 5 is ten times as acid as pH of 6, or 100 times as acid as pH of 7. Furthermore, a strong acid, normal solution, is pH of 0 (zero), and the strong alkali normal solution is pH of 14.

It is thus clear that a pH of 7 is the neutrality point, because (H) ion concentration is equal to (OH) concentration. Under 7 is acidity, over 7 is alkalinity; a pH of 9 is ten times as alkaline as a pH of 8, or 100 times as alkaline as a pH of 7.

Each point of the pH scale representing a multiplier of 10, it will be noted that at or near neutrality, or pH 7, small amounts of acid or alkali will change the pH rapidly, but as we get into the stronger acids or alkali solutions, such as pH 3 or pH 11, large amounts of the acid or alkali must be added to change the pH value.

Thus a drop of acid will change pH of a vessel of water from 7 to 6, but ten drops more are needed to change it from 6 to 5.

This numerical expression of alkalinity, plus knowledge of the molecular weights of chemicals, enables chemists to compute the number of pounds of chemicals to add to a given weight of water to change its pH value to the desired point.

	pH SCALE	H-ION CONCENTRATION IN GRAMS PER LITER FRACTIONAL NOTATION	EXPONENTIAL NOTATION
	0	$\frac{1}{1}$	10^{0}
STRONG ACID	1	$\frac{1}{10}$	10^{-1}
	2	$\frac{1}{100}$	10^{-2}
	3	$\frac{1}{1,000}$	10^{-3}
	4		
	5	$\frac{1}{100,000}$	10^{-5}
	6		
PURE WATER	7	$\frac{1}{10,000,000}$	10^{-7}
	8		
	9	$\frac{1}{1,000,000,000}$	10^{-9}
	10		
	11	$\frac{1}{100,000,000,000}$	10^{-11}
STRONG ALKALI	12		
	13		
	14	$\frac{1}{100,000,000,000,000}$	10^{-14}

COMPARISON OF pH SCALE WITH H-ION CONCENTRATION

The pH scale runs from 0 to 14 and was designed to simplify the designation of the acidity or alkalinity of solutions. The halfway point, 7, represents a neutral solution such as pure water, which is neither acid nor alkaline. The fractional and exponential notations that correspond to some of the scale markings are given at the right. For example, a solution that contains one one-hundred-thousandth, or 10^{-5}, gram of dissociated hydrogen ions per liter has a pH of 5. Dissociation in aqueous solutions is affected by temperature. Tests are normally made at 72°F.

QUESTION

What is the importance of pH value in boiler water?

ANSWER

Lack of correct pH causes many and various troubles, such as pitting, corrosion, carryover, wet steam, caustic embrittlement tendency, and others.

As explained in our last article under "Corrosion," the tendency for iron to go into solution is large in solutions with low pH number, and gets less with the increasing value of the number, until at pH of 9.6 it is minimum. Thus an alkalinity is desirable to prevent corrosion.

On the other hand, too high a pH number gives the effect of soapiness, foaming, carry-over with deposits on the turbine blades. A value much over pH 11 may cause such trouble. Thus pH must be known and controlled.

Furthermore, the pH of the feed is not the pH value of the boiler, which will be higher. Knowing pH of feed and boiler, the blow-down can be calculated; or, conversely, the blow-down can be used to help control boiler pH.

Fortunately the chemicals used in treating to prevent scale, such as the carbonates, phosphates, etc., all are alkalizing in their effect. But usually there is no fixed relationship between the required amount of chemical for scale and for pH value, and the required amount brings the pH value above desired limits. The problem, then, is to hold the pH number down, yet feed enough carbonates or phosphates always to keep an excess of these to prevent scale. There are phosphates available which have a low alkalinity effect, which are desirable in the simultaneous control of excess phosphate and alkalinity.

Where carbonates or phosphates are used, the excess alkalinity may be reduced by adding acid in the form of sodium acid phosphate and alkalinity. The Hall Sys- added with great care directly into boiler drum, otherwise acid corrosion of the feed lines and heaters will result. Also they raise the sulphate content, making it difficult to control the phosphate to sulphate ratio, which is so important at the higher pressures.

QUESTIONS FROM THE SHIPS

Question: How would you answer the following question sent out by the Bureau?

(1) Describe a thermostat as used in fire-detecting systems.

(2) Describe fire-detecting system of the electro-pneumatic type. Of the electric type.

—O. L. H., New York.

ANSWER

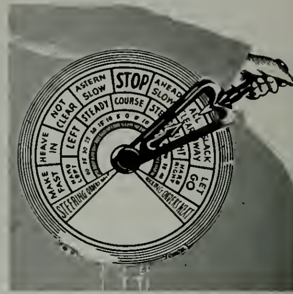
(1) A thermostat is the sensitive element which acts to close an electric circuit or otherwise disturb a system when the temperature of the space where it is located is raised above its calibrated value.

Several types are available. The principal difficulty is to get one

(Page 64, please)

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Some Laws Governing Navigation and Ship Operation

"The Skipper" has recently received so many requests for information about the various laws that govern the men who go to sea that he is taking this opportunity in clearing up questions asked and using for example the first eleven questions printed in a recent Bulletin.

QUESTION

A vessel sailing from San Francisco to ports in the Orient has the following documents on board: (a) ships articles, (b) forecastle card, and (c) official logbook. Give a brief description of each.

ANSWER

(a) *Ship's articles* are signed before the Shipping Commissioner by the master and crew, and contain the conditions under which they enlist for the voyage.

(b) *Forecastle card* is a legible copy of the ship's articles, omitting signatures, placed or posted up in such part of the vessel as to be accessible to the crew.

(c) *Official logbook* is a logbook kept by the master, in which are made entries of any and all unusual occurences of the voyage, and the circumstances under which they happened, such as births, deaths, marriages, convictions, punishments, fines, forfeitures, illness of the crew, collisions, heavy weather, storms, strandings, touching bottom or other events, which by any possibility could cause damage to the ship or cargo. Every entry in the official logbook should be signed by the master and by the mate or some other member of the crew, and every entry shall be made as soon as possible after the occurance which it relates.

QUESTION

Standing orders stipulate that none of the crew shall frequent the passenger quarters when not on duty. The master of a vessel fined a seaman four days' pay for this offense, but failed to furnish the offender with a copy of the log entry or state that same had been read to the offender; also failed to note the offender's answer or have another member of the crew witness the entry. Can the master enforce the fine?

ANSWER

No, the master cannot enforce the fine for the following reasons: Upon the commission of an offense, an entry thereof shall be made in the official logbook on the day on which the offense was committed, and shall be signed by the master and by the mate or one of the crew; and the offender, if still in the vessel, shall, before her next arrival at any port, or, if she is at the time in port, before her departure therefrom, be furnished with a copy of such entry and have the same read over distinctly and audibly to him, and may thereupon make such a reply thereto as he thinks fit; and a statement that a copy of the entry has been so furnished, or the same has been so read over, together with his reply, if any, made by the offender, shall likewise be entered and signed in the same manner. In any subsequent legal proceedings the entries hereinbefore required shall, if practicable, be produced or proved, and in default of such production or proof the court hearing the case may, at its discretion, refuse to receive evidence of the offense.

QUESTION

A crew have demanded their discharge from a vessel, claiming that the master has refused them a draw of one-half their wages at a port, when the vessel loaded bunkers only. Admitting that a refusal of a draw in a port when and where due is basis for the crew to demand their discharge from the vessel, in this case should the master accede to the demand or not? State your reason.

ANSWER

The master should not accede to the demand, as the law states that a demand for a draw can only be made where a vessel shall load or discharge cargo. This law reads:

Every seaman on a vessel of the United States shall be entitled to receive on demand from the master of the vessel to which he belongs one-half part of the balance of his wages

earned and remaining unpaid at the time when such demand is made at every port where such vessel, after the voyage has been commenced, shall load or deliver cargo before the voyage is ended, and all stipulations in the contract to the contrary shall be void. Provided, such a demand shall not be made before the expiration of, nor oftener than once in five days nor more than once in the same harbor on the same entry. Any failure on the part of the master to comply with this demand shall release the seaman from his contract and he shall be entitled to full payment of wages earned.

QUESTION

A member of the crew of a vessel committed an offense against the law of the country in whose port the vessel was docked. The local police came on board to arrest the offender so that he might be tried before the local courts. Should the master or ship's officers allow the arrest of the seaman?

ANSWER

If it is any country except China or Egypt, the police should be allowed to arrest the man, as the United States has signed agreements to that effect. However, if it was in a port in China or Egypt, the master or ship's officers should not turn the man over to the local police, but refer them to the American Consul and abide by his decision.

QUESTION

A master purchases cigarettes for the ship's slop-chest out of bond at the port of departure for 60 cents per carton and charges the crew $1.00 per carton in the slop-chest. Should the master be allowed to charge this price?

ANSWER

The master should not be allowed to charge this price, as any of the contents of the slop-chest shall be sold, from time to time, to any or every seaman applying therefor, for his own use, at a profit not exceeding 10 per cent of the reasonable wholesale value of the same at the port at which the voyage commenced.

QUESTION

In computing a vessel's payroll at the end of the voyage, the articles show that certain seaman's wages commenced on January 29, 1935, and ended on March 25, 1935. Others of the seamen commenced work on January 30, 1935, and ended on March 25, 1935, while still others commenced on February 1, 1935, and ended on March 25, 1935. What is the computation for months and days for these three groups of seamen?

ANSWER

Each group would receive 1 month and 25 days pay.

QUESTION

In a large passenger vessel, a man who is placed in charge of the banking facilities is signed on the articles as a "banker." Is this man a seaman? State also whether the master is a member of the crew.

ANSWER

The man signed on as a "banker" is a seaman, and the master is not a member of the crew, according to the following law: *Every person having the command of any vessel belonging to any citizen of the United States shall be deemed to be the 'master' thereof; and every person (apprentices excepted) who shall be employed or engaged to serve in any capacity on board the same shall be deemed and taken to be a 'seaman'; and the term 'vessel' shall be understood to comprehend every description of vessel navigating on any sea or channel, lake or river, to which the provision of this Title may be applicable.*

QUESTION

Is a vessel engaged in the United States intercoastal trade required to carry or have on board a medicine chest? A slop-chest?

ANSWER

Every vessel belonging to a citizen of the United States, bound from a port in the United States to any foreign port, or being of the burden of seventy-five tons or upward, and bound from a port on the Atlantic to a port on the Pacific, or vice versa, shall be provided with a chest of medicines. If, on any such vessel, such medicines or medical stores are not provided and kept on board, as required, the master or owner shall be liable to a penalty of not more than $500.

Every such vessel, except vessels engaged in the whaling or fishing business, shall be provided with a slop-chest, which shall contain a complement of clothing for the intended voyage for each seaman employed, including boots or shoes, hats or caps, underclothing and outerclothing, oiled clothing, and everything necessary for the wear of a seaman; also a full supply of tobacco and blankets. And if any such vessel is not provided, before sailing, as herein required, the owner shall be liable to a penalty of not more than $500.

QUESTION

John Doe and his wife, Elizabeth, of Canton, O., U.S.A., take passage on a vessel, and during the voyage, while at sea a child is born to them. Write the entry you would make in the official logbook.

ANSWER

Aboard the S.S. ——————
in Latitude——— Longitude———
Date—————— Time———

Born this day to John Doe, age 25 years, and wife Elizabeth Smith Doe (give wife's maiden name), age 22 years, both native born citizens of Canton, O., U. S. A., a white male child.

QUESTION

While en route San Francisco to Honolulu, a member of the crew dies. Write the entries necessary, and required by law, to be made in the official logbook.

ANSWER

The cause of death.

A statement of the amount of money so left by the deceased.

In case of a sale, a description of each article sold, and the sum received for each.

A statement of the sum due to deceased as wages, and the total amount of deductions, if any, to be made therefrom.

QUESTION

Suppose the crew complain of the provisions when in port; what should be done?

ANSWER

Any three or more of the crew of any merchant vessel of the United States bound from a port in the United States to any foreign port, or being of the burden of seventy-five tons or upward, and bound from a port on the Atlantic to a port on the Pacific, or vice versa, may complain to any officer in command of any of the vessels of the United States Navy, or consular officer of the United States, or shipping commissioner or chief officer of the Customs, that the provisions or water for the use of the crew are, at any

(Page 64, please)

On the Ways — SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Keel Laid At Tacoma Shipyard

With roughly 100 days elapsed time from foundation of the shipyard to foundation of the first ship, March 5 was a great day for Puget Sound shipbuilding on the occasion of the impressive keel laying ceremony at Tacoma for the first of five C-1 freighters to be built at the Seattle-Tacoma Shipbuilding Corporation plant.

With all heavy equipment in place, a full stock of supplies and steel, the crew trained and the welding apparatus hooked up for a speedy start on the orders for the Maritime Commission, the keel-laying ceremony, to which thousands came, appeared more like a routine day in a big shipyard already in operation. Everybody wears tin helmets—even the in and out members of the office force. The Governor of Washington, Clarence D. Martin; Mayor J. J. Kaufman of Tacoma, and Mayor Arthur Langlie of Seattle—the distinguished trio who helped welder H. L. Thies get the first foot or two of the keel welded in place—each pronounced an optimistic benediction on the revival of big-time steel shipbuilding on Puget Sound after a 16-year lapse, since the Bienville steamed away to end the war-time building boom.

Keel laying at Seattle-Tacoma Shipbuilding Corporation's Tacoma plant. At left, the man in glasses and tin hat is J. J. Kaufman, mayor of Tacoma; man in black with tin hat on right knee is Arthur B. Langlie, mayor of Seattle; back of and bending over Mayor Langlie is Clarence Martin, governor, State of Washington.

President Lamont, General Manager Green, the host of waterfront notables who turned up—practically every nautical person from Bellingham to Portland was there—all pronounced the new yard a complete success and capable of high speed, efficient production of ships on a cost basis comparable to the Atlantic Coast, despite much higher wage levels.

Admiral Land spoke over long-distance telephone. The shipyard office force, bossed by Mr. Tucker, the busy assistant to Mr. Lamont, poured out, carved and sliced off great hospitality to some 1,000 guests in the huge office building, some 45 bigwigs journeyed to the rooftop Tacoma Club and toasted the Future of Shipbuilding on Puget Sound until the night janitor arrived . . . old-timers missed the clatter of rivet guns, but marveled at the automatic welders with vacuum cleaners following to pick up the excess fluxing powder.

Among those present were the following:

Harold Allen, president, Tacoma Dredging Co.

Col. C. B. Blethen, publisher, Seattle Times.

John Boettiger, publisher, Seattle Post-Intelligencer.

Col. Bickford, Port of Seattle.

Frank S. Baker, publisher, Tacoma Tribune.

J. D. Corbett, Jr., Marine Digest.

Otis Cutting, president, Lake Union Drydock.

Earl Doran, the Doran Company.

J. F. Duthie, Shipping.

Frank Evers, American Bureau of Shipping.

Halmer Eastwood, Public Safety Commissioner, Tacoma.

Henry Foss, Foss Tug and Barge Company.

James Frink, Washington Iron Works.

Francis Frink, Washington Iron Works.

Gerald Frink, Washington Iron Works.

Weddel Foss, Foss Tug and Barge Company.

Arthur Foss, Foss Tug and Barge Company.

Capt. James Griffiths, James Griffiths & Son.

Stanley Griffiths, James Griffiths & Son.

H. J. Hart, Puget Sound Tug and Barge Company.

Chas. H. Ingram, Weyerhaeuser Timber Co.

Ralph Jenkins, V. S. Jenkins Valve Co.

Victor S. Jenkins, V. S. Jenkins Valve Co.

Winston Jones, Alaska Transport Company.

Hon. J. J. Kaufman, Mayor of Tacoma.

Hon. Arthur Langlie, Mayor of Seattle.

R. J. Lamont, president, Seattle-Tacoma Shipbuilding Corp.

C. F. A. Mann, Pacific Marine Review.

J. A. McEachern, vice-president of the shipyard.

E. C. Mausshardt, U. S. Maritime Commission.

Wallace Morrissette, president, Building Trades Council, Tacoma.

C. H. Markey, Markey Machinery Company.

Hon. Clarence D. Martin, Governor of Washington.

William Nickum, Naval Architect.

Capt. Peabody, Puget Sound Navigation Co.

T. E. Roach, president, Washington Gas and Electric Co.

T. A. Stevenson, manager, Tacoma Chamber of Commerce.

Henry Seaborn, Skinner & Eddy Corporation.

Gilbert Skinner, Skinner & Eddy Corporation.

Thomas Skinner, Marine Supplies.

Carl Strout, manager, Alaska Transportation Co.

F. R. Titcomb, Weyerhaeuser Timber Co.

A. R. Van Sant, Lake Washington Shipyards.

Paul E. Voinot, Lake Washington Shipyards.

Mr. Wintermute, General Steamship Corporation.

Twin Launching At Federal

Two Navy destroyers, the U. S. S. Plunkett and the U. S. S. Kearny, figured in a twin launching on March 9 at the Federal Shipbuilding and Dry Dock Company, Kearny, N. J., a United States Steel Corporation subsidiary.

The two ships were constructed on adjacent shipways. The Plunkett was

(Page 61, please)

Super Survey Vessel Explorer

(Continued from page 29)

of 26" referred to a 30" barometer when supplied with 350 g.m.p. of circulating water at 70 degrees F. The design is based upon a tube cleanliness factor of 85 degrees. The water circuit is two-pass. Tubes are rolled at the inlet ends of each pass and packed with Anchor metallic packing at the discharge ends.

The two main feed pumps are Worthington, and are driven by Terry steam turbines. The feed water heater is a Paracoil.

A compact but quite elaborate machine shop occupies one side of the upper grating level of the engine room. The tools include a boring mill, lathes, drill presses, shapers, power hack saws and grinders. Here there is equipment not only for shipboard repairs but for repairs to survey gear, boats, engines, signals and shore station equipment.

On the other side of the engine room, at the upper level, room is provided for the York refrigerating machinery, a Worthington air compressor, and a motor generator set for low-voltage work.

Miscellaneous Equipment

Where the special non-skid rubber cement deck coating is not practicable, heavy calked decking is laid down. Heinz Mfg. Co., Philadelphia, Pa., supplied the watertight steel deckhouse doors. Two one-ton cargo booms are fitted to handle cargo and lower gear into the smaller boats. The ship has a pair of tall, welded steel, hollow masts. She is strikingly painted in brilliant white with brown deckhouse and wide bridge wings, which, with the red raked stack and masts, curved yacht-like stem and trim cruiser stern, give her the appearance of a beautiful white cruiser. Only the large group of workboats slung to her sides give the Explorer away.

Survey Equipment

So closely tied together are the surveying and navigation equipment, and so complex is their layout, that it is well to discuss them as a unit. The navigation equipment is based on the Markey steam steering gear, Sperry metal mike, Sperry gyro compass, RCA direction finder, and a complete intercommunication system within the ship. The RCA radio set is equipped for both long and short range, sending and receiving, and includes a very powerful code-sending and receiving set.

Sperry repeating compasses are fitted on the bridge wings and emergency steering station. A battery of powerful Sperry searchlights are mounted on the bridge, and two side floodlights are installed above the pilot house window level. A Sperry rudder angle indicator and a meridian log are fitted, besides an electric tachometer repeater.

Included in the special survey equipment are a special taut wire measuring gear, made by the British Telegraph Construction and Maintenance Co., Ltd., London, with 120 miles of fine wire and several tons of iron balls; a Hughes depth recorder system, which records depths automatically, on wide tape, as the ship progresses; a Fathometer, and a Dorsey sonic depth finder. Special sonic equipment is fitted to the hull in special cofferdams for use with the surveying instruments and for use with depth charges of dynamite. A Walker trident taffrail log and indicator are carried. The Clark Cooper & Son steam whistle is fitted with Henschel automatic time device for code signaling. Two Kleer Vue rotary glass windows are fitted in the pilot house.

The last bit of work done on the ship before her final bottom painting was to fit special electrolysis eliminators to the hull, to ground all stray currents, and make the ship "dead pan" as far as electric sounding devices are concerned.

The Explorer is a credit to her builders, supervisors and the Coast and Geodetic Survey, representing an investment of about $1,500,000 for ship and equipment. She replaces the old Explorer, now tied up in Lake Union, Seattle, and owes her existence to the good offices of the PWA, who have loaned the Survey office money for this vessel's construction.

Commander Soberialski will take the new Explorer into the Far Western Aleutians this summer to begin surveying parts of that vast and lonely stretch of 2,500 miles of bleak islands, that stretch beyond the International Date Line, towards

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The Dividing Line on *Regulation of Shipping*

by Comm. R. S. Field

Director, Bureau of Marine Inspection and Navigation

The Department of Commerce is charged with the promotion of commerce. Shipping is commerce. The Department is also charged with the regulation of shipping. It must therefore be accepted as a basic formula in any common-sense appraisal of the Department's work that the Department wants promotion with regulation rather than regulation versus promotion.

The Bureau, of which I am the director, is charged with the formulation and the enforcement of rules and regulations for the control of certain phases of ship operation, and especially for the maintenance of safety on our American merchant ships. We wish to make this a cooperative job between shipping and the Bureau.

Mr. Hopkins, the present Secretary of Commerce, is very much interested in this work of producing a satisfactory and workable set of rules and regulations.

Colonel Monroe Johnson, Assistant Secretary of Commerce and my immediate superior, has very practical ideas on the subject. He has frequently said to me, "We must regulate to obtain safety, but we must try very hard to find that obscure *dividing line between enough and too much* regulation."

The Bureau, in its annual report, cites the marvelous safety record of the American Merchant Marine, and gives credit:

First, to the officers and men who man the ships;

Second, to the owners and operators who hire the men and insist on high standards; and

Third, to the personnel of the Bureau, which points the way and uses sanctions of the law in the rare cases where such sanctions are needed.

When we compliment each other on safety records at sea we do so with a full realization that sea safety is not only our moral obligation to the public but also a practical business necessity. A breakdown of safety at sea would cost ship operators their investment and the welfare and security of all their employees.

A short review of recent history in regard to regulations affecting safety at sea shows a real effort for cooperation between the industry and the Bureau. In 1931 a strong committee composed of representatives from the American Steamship Owners' Association, the National Council of American Shipbuilders, the American Bureau of Shipping and the Steamboat Inspection Service, was formed to revise the General Rules and Regulations. This committee did a very fine job, for which it never had much credit, because just as it was completing its work, came the two big sea disasters with the attendant public indignation, panic legislation and loss of confidence in the safety supervising agencies.

So in 1935 a Senate resolution effected the organization of a group of outstanding naval architects, shipbuilders and Government experts as a technical committee to investigate the disasters. This committee put in a lot of hard work, and in 1937 presented its report in the form of rules and regulations, which were subsequently printed in the form of Senate Report No. 184, and are conceded to be an outstanding contribution towards safety at sea.

A bill to make the contents of this report into law passed in the Senate but failed in the House.

The Bureau of Marine Inspection and Navigation believes that the contents of S.184, generally speaking, should be made into regulations by the Board of Supervising Inspectors, but that they should never be frozen into hard-and-fast law.

The Bureau has been working for more than two years now on the proposed Ocean and Coastwise Rules and Regulations. The Bureau has adopted a policy of changing and creating rules and regulations only after submission of such changes and additions to persons interested, and after public hearings. Pursuant to this policy, tentative drafts of the proposed rules and regulations were submitted to the industry for study and comment on October 1, 1939. At first it was thought that three months would be sufficient time for this, but as a result of comments and replies received prior to the middle of December, 1939, the Bureau advanced the dead line date for comments on the initial draft to April 1, 1940. If the number and the character of the comments received warrant such action, a new draft incorporating suggested changes will be circulated.

These rules form a bulky volume in mimeograph form. They are divided into nine chapters:

(1) General
(2) Construction
(3) Subdivision and Stability
(4) Fire Control
(5) Engineering
(6) Lifesaving Equipment
(7) Special Appliances
(8) Ship Personnel
(9) Inspection and Operation.

Chapter 8, concerning licensed personnel, should be carefully considered. There seems to be no case of a marine disaster on record where the human element does not come in for the greater part of the blame. Trite but true, a ship is only as seaworthy as the men who man her.

For a number of years licensed officers of the American Merchant Marine, in spite of their enviable record, have been criticized and the Bureau has been criticized on account of our examination system, the common saying being that it has been too easy to obtain an officer's license. This attitude has been reflected in Senate reports, testimony before the House Merchant Marine and Fisheries Committee, and in other mediums.

Now we propose to make the examinations harder, and we are being criticized for that. It is possible that the language we have used in announcing the new types of examinations has been misleading. For instance, the term "trigonometry" scares a candidate to death. He does not realize that every time he works out a sight he is using trigonometry.

Many practical engineers who demonstrate daily their acquaintance with the principles of thermodynamics would be frightened at a reference to that subject. We realize that although we hope ultimately to have a central examining board in the Bureau, we must not adopt a system which will bar the excellent engineer or deck officer who is, either by nature or by lack of education, not able to express himself with a pencil and paper. Therefore, our eventual system must provide to give weight to the impression made by the candidate on the inspectors who conduct the examination and have an opportunity to question the man and form an opinion of his character by observation.

A question has been raised on the assumption that the proposed stepping-up of requirements for licenses would secure an improvement in caliber in the lower grades first, and the question is, if such a fact should develop and we should have junior officers more capable and more intelligent than the older officers, notably, masters and chief engineers, would this result in an inferiority complex on the part of the older officers, and introduce a difficulty in their relations with the younger and supposedly better educated officer? Personally, I cannot see any such problem. I feel that any improvement, either in the lower grades or the higher grades, will be very gradual, and if it should be first demonstrated in the lower grades, I can see no occasion for any change of attitude on the part of the senior officers toward this supposedly new type of junior officer.

Any master or chief engineer, whether he be below or above average ability, should recognize the advantage to himself of having an outstanding young officer on his staff, because the more able his assistants are, the more easily he can perform his own duties.

In regard to this subject of examinations of officers, I can only say that we have no idea of being adamant, and will be influenced by the reasonable opinion and advice of the people concerned.

We had splendid results in the production of our new Tanker Rules. A committee, made up of representatives of the American Petroleum Institute and the leading oil companies, worked industriously and unselfishly for a long time to assist the Bureau in that job. The result was much better than the Bureau could have achieved without their help. That set of rules is the most satisfactory that we have ever had, and causes less difficulty and question than any of our other departments. We hope ultimately to use such a method in the case of all new regulations. Since that time we have gradually built up a policy of referring all rules on all subjects, except occasionally in an emergency, to the people concerned before moving their adoption.

The Cadet System of the Maritime Commission

The United States Maritime Commission announced on March 11 that 375 young men had successfully completed the second national examination for deck and engineer cadets in the American Merchant Marine.

Rigid scholastic and physical qualifications, required by the Commission reduced the number taking the mental test held on January 29, 1940, from the several thousand who made preliminary applications to 535. Of this number, the following were successful:

Engineer Cadets	
Atlantic	149
Pacific	33
Gulf	18
Total	200
Deck Cadets	
Atlantic	113
Pacific	36
Gulf	26
Total	175

A percentage of the 375 who passed the scholastic test are expected to fail in their physical examination to be given by the United States Public Health Service. The successful candidates were from thirty-nine states, District of Columbia, Canal Zone and Puerto Rico.

Appointments will be made from the eligible list as vacancies occur. There are facilities for training approximately 400 cadets at one time as merchant marine officers on the eighteen steamship lines subsidized or owned by the Government, and on the cooperating non-subsidized lines.

The Maritime Commission's Cadet

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PACIFIC MARINE Reviews

New B & W Marine Man At S. F.

C. C. Moore & Co., Engineers, Pacific Coast representatives of The Babcock & Wilcox Co., announces the addition to its organization of **W. B. Hill, Jr.**, who has joined the marine department, with headquarters at San Francisco.

Upon graduation from Yale University, Mr. Hill entered the employ of The Babcock & Wilcox Co., where he completed a special training course in the design, manufacture and construction of the company's various equipment. He was later assigned to the marine department, New York, as sales engineer. His work in this department brought him into intimate contact with all phases of design, operating and service problems related to marine boilers, and particularly the more modern development in high-pressure boilers.

W. B. Hill, Jr.

V. W. Hoxie, who has a wide acquaintance in Pacific Coast marine circles, has been appointed consulting engineer, marine department, of C. C. Moore & Co., as Pacific Coast representatives of The Babcock & Wilcox Co. He will act in an advisory capacity, where his long years of experience and extensive knowledge will be available in marine work.

V. W. Hoxie

Inspector Returns

Back to his old stamping grounds on the Pacific Coast is **William H. McKenzie**, well-known in Pacific Coast shipbuilding circles by a host of friends, who will recall him from the World War shipbuilding days.

W. H. McKenzie

He has recently returned from the Sun Shipbuilding and Drydock Co.'s plant in Chester, Pa., where his duties included the inspection of all machinery before and after installation—on cargo and refrigerating vessels.

Bill McKenzie has had a most interesting career as a mechanic, with the ingenious talent of invention. He is responsible for several labor-saving devices which are now in current use. During many of his associations with leading industrial and shipbuilding plants, he has been able to work out innumerable time- and labor-saving plans. One of his inventions was a pipe-testing machine for handling pipe of any size or length, and for testing all types of valves and fittings without the need of drilling, without the use of clamps, bolts or flanges for testing.

Before his appointment for inspection service at the Sun yard, he was engaged at the Mare Island Navy Yard during the construction of several cruiser, destroyer and submarine jobs. His Pacific Coast friends will remember him best from the old Shipping Board days, when he was employed at the Moore Drydock Co.'s yard as general foreman. During these years, McKenzie assisted in the construction of over 35 vessels for the account of the U. S. S. B.

Before arriving in Oakland, he visited the technical offices of the U. S. Maritime Commission in Washington, D. C., where he submitted new labor-saving devices for the consideration of the Commission and Navy Department.

Junior C of C Greets New Liner

Welcoming the new transpacific service of the Java Pacific Line to San Francisco, Junior Chamber of Commerce officers last month presented their special photographic placque to **Capt. Van der Est,** master of the M. S. Jagersfontein on the occasion of the first regular sailing from this port.

With four streamlined ships commissioned for the run to the Netherlands Indies and India, the new line will operate on regular schedule, with San Francisco as "home port" on this side of the Pacific.

"With the tremendous interest shown by San Francisco business groups, and even by the man in the street, regarding development of maritime affairs, the inauguration of this new passenger service comes at an appropriate time," stated Guy Staecy, of the Maritime Committee. **"This is really serving notice that San Francisco will continue to be the maritime leader on the Pacific Coast."**

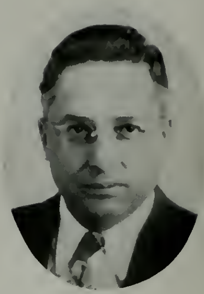
Fitted with every facility for luxurious ocean travel, the four Java Pacific liners follow a route famed for its tropical beauty and variety of scene. Stopping first at Hawaii, ship itineraries call for three visits in the Philippines, a cruise throughout the Sulu Seas past Borneo to Bali, where passengers may stop over for leisurely exploration and sightseeing. Java, Sumatra, Singapore, Rangoon and then India complete the route.

Lending added attraction to the route is the fact that these neutral ships cruise untroubled areas, lending further peace of mind to those seeking leisurely relaxation or adventure.

JOINS NATIONAL TUBE

David T. Marvel, formerly Manager Tube Sales, Timken Steel and Tube Division of Timken Roller Bearing Co., Canton, Ohio, has joined National Tube Company's sales organization in the capacity of Assistant Manager of Sales, Ellwood Sales Division, Ellwood City, Pa.

Shown during a recent get-together during the inauguration days of the new Java Pacific Line are, left to right, Cept. S. Bakker of the Salawati, Capt. M. A. Van der Est of the Jagersfontein, and Capt. J. Van der Meer of the Taraka. They were busy discussing plans for the new line, which will travel neutral seas to Java and India.



Joseph M. Costello

Soot on the Run!

William H. "Bill" Rudy, Pacific Coast sales manager of XZIT Sales Company, announces the appointment of a new sales agency for XZIT, soot and fire scale eradicator, at Wilmington, Calif.

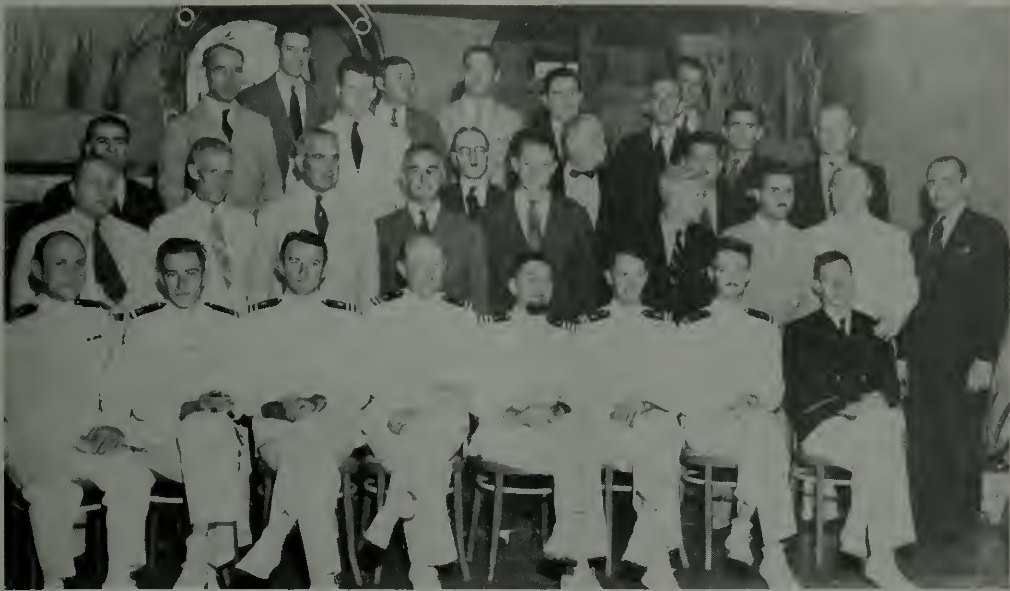
Joseph M. Costello, well-known Coast chief engineer, has been named for this district agency.

Joe Costello opened his own business very recently at 221 North Avalon Boulevard, Wilmington, He has been active for several years in sales agency work around the Los Angeles-San Pedro Harbor district and has a host of friends in marine circles—particularly around the famous Bilge Club.

Currently he is a candidate for membership on the Board of Education in his locality.

He studied marine engineering at the University of California and has taken special courses in other educational institutions. During the World War he served in the marine service of the Army and Navy Transports as well as the merchant marine, during which time he secured his United States Marine Engineer's license.

In addition to his engineering work, Mr. Costello has had extensive experience in railroading, power house engineering, and engineer in charge of buildings and equipment and has acted for several years as financial secretary of California No. 1 National Association of Power Engineers.



Photograph taken on the occasion of the recent visit of the California Schoolship to San Juan, P. R. The San Juan Propeller Club arranged a luncheon for the officers of the ship and also provided buses to conduct the cadets on a two-hour sightseeing trip of San Juan and vicinity.

California School Ship Visits Newport News

Pacific Marine Review
B. N. DeRochie, Vice-President
500 Sansome Street
San Francisco, Calif.

My dear Mr. DeRochie:

I think you will be interested in the enclosed brochures which we prepared for the visit the end of this week of the training ship California State.

A personal link between the California Maritime Academy and this company is that Captain Neil E. Nichols, U.S.N. (retired), superintendent of the Academy, is a brother of John F. Nichols, chief engineer of our company.

Yours very truly,
(Signed) E. G. ROGERS,
Sales Representative.

The brochure which Mr. Rogers thoughtfully sent us is an attractively-planned greeting to the officers and cadets of the California State, containing pertinent data answering any and all questions which the young men might conceivably ask. Of particular interest, these facts:

Vessels Now Under Construction:

Transatlantic liner.
One C-2 cargo vessel.
Three oil tankers.
Seven C-3 passenger and cargo vessels.
One aircraft carrier.
One battleship.

Merchant Vessels:

The transatlantic liner America, the largest passenger vessel constructed in this country, is scheduled for completion in June, 1940.

The C-2 cargo vessel, Santa Teresa—This is the last of a group of four.

The oil tankers, Esso Richmond, Esso Raleigh, and Esso Columbia (149,000 bbls. cargo oil capacity).

The C-3 passenger and cargo vessels, President Jackson, President Monroe, President Hayes, President Garfield, President Adams, President Van Buren, President Polk, the first of which will be launched in May, 1940.

David C. Jones, vice-president and general manager of The Lukenheimer Company, Cincinnati, Ohio, died on March 11 after a brief illness. He was born in Cincinnati on November 14, 1876, and entered the employ of The Lukenheimer Company on January 1, 1894. He was prominently identified with industrial and banking activities in Cincinnati, and also had served as president of the American Supply and Machinery Manufacturers' Ass'n.

L. W. Ferdinand & Co., Inc., Boston, is now introducing a new product called Ferdico Synthetic Resinous Adhesive, which is a waterproof glue particularly adapted for making solid joints, for building plywood boats, hollow masts, etc. It has a distinct advantage over casein glue in that it is positively waterproof.

We Bow to the Ladies!

Mr. J. S. Hines, President

Pacific Marine Review

500 Sansome Street

San Francisco, Calif.

Dear Mr. Hines:

My assistant, Miss S. S. Marks, has just been named chairman of the publicity committee of the Women's Traffic Club of San Francisco. This organization is composed of secretaries of traffic managers, etc., and is organized for the purpose of fostering good will and friendship between shippers and carriers and consignees.

At a meeting to be held March 26, Mrs. Sophie Gallagher, secretary to Mr. M. J. Buckley, of American President Lines, will be installed as president of that club.

Do you think you have it in your heart to overlook the great superiority of the male sex and give a tumble to the superior sex by printing a little item about this?

Furthermore, with that pertinacity which characterizes my assistant, she wishes to immortalize Mrs. Gallagher in a glossy paper publication, so she has even gone to the trouble of digging up a glossy print. You print so many photos of handsome men and mugs, that maybe a relieving feminine touch might do!

If this is asking too much of you, hope you will print it anyway—this once.

Awaiting with bated breath your action, I am, with kindest regards,

Yours very truly,

NAT LEVIN, Secretary,
Shipowners Association of the Pacific Coast.

Dear Mr. Levin:

Never let it be said that a "gentleman of the deep South" is lacking in chivalry! Convey my thanks to the ladies . . . tell them to send us more news items.

Best wishes!

JIM HINES.

Marcia Morris of the J. E. Lowden Co., president of the Women's Traffic Club of San Francisco for the past year, turned over her gavel to **Sophie M. Gallagher** of American President Lines, president-elect, at the annual installation party of the club. The affair was held in the rooms of the Transportation Club at the Palace Hotel, Tuesday evening, March 26.

Nan G. Lawrence of S. F. Machinery Dealers Ass'n, who has acted as installing officer of the club since its inception, not only officiated over the installation ceremonies, but acted as mistress of ceremonies for the program that followed.

Other officers who were installed were **Irene Mackin** of Haslett Warehouse Co., vice-president; **Janet Davis** of American-Hawaiian Steamship Company, secretary, and **Martha Irons** of Owl Drug Co., treasurer.

Kay Bugbee of Luckenbach Steamship Co., **Virginia Kennedy** of Bay Shore Transportation Co., and **Hilda Miehle** of Pacific Consolidators, Inc., have been elected to serve on the board of directors for the coming year.

Chairmen of committees named for the ensuing year are **Marcia Morris** of J. E. Lowden Co., membership; **Bess Jackson** of American-Hawaiian Steamship Co., program; **Mabel Delucchi** of American-President Lines, entertainment; **Nan G. Lawrence** of S. F. Machinery Dealers Ass'n, reception; **Ruth Casella** of Howard Automobile Co., research, and **Sonya S. Marks** of Shipowners' Ass'n of the Pacific Coast, publicity.

Sophie M. Gallagher (secretary to M. J. Buckley of American President Lines), who was installed as president of the Women's Traffic Club of S. F. on March 26 at the Palace Hotel.

News of "The Bilge Club"

The Annual Load Line Inspection of the Bilge Club . . . and we are referring to their twelfth annual banquet . . . is announced! The big date is Saturday, April 6—at the Biltmore Hotel in Los Angeles.

The clarion call of **Dan Dobler**, chief surveyor of The Bilgers, makes irresistible reading. We quote:

"Your many BILGER friends and guests or recognized classification societies will attend for the purpose of inspection of:

"(1) Protection of openings.

"(2) Guard rails.

"(3) Freeing ports.

"(4) Means of access to crew's quarters, to determine if same are maintained in effective condition; also, that no alterations have been made to hull or superstructure which would effect the calculations determining the position of the Load Line.

"Vessels not to be loaded below SUMMER FREEBOARD.

"Permissible LIST not to exceed 20 degrees (port or starboard).

"Additional orders:

"LIQUID CARGO, which may be taken on board commencing at 6:30 p. m. shall be carried in double bottoms only, care being observed that same is not loaded in such manner as to make your vessel unsafe or unseaworthy.

"DRY CARGO, to be stowed commencing at 7:30 p. m., in main

holds, making due allowance for final trim with liquid cargo.

"ENTERTAINMENT, the best yet (consult your program).

"SURVEYOR'S FEE, $5.00.

"NOTE—The Surveyor requests that you "Dress Ship" (formal attire) for this occasion.

"Make reservations for banquet and inspection immediately by returning the enclosed card together with check, to E. R. Nelson, Secretary, P. O. Box No. 231, San Pedro.

"Signed) DAN DOBLER,
Chief Surveyor."

W. H. "Bill" Nickum, Jr., who with his father and brother, supervised architectural details of the Explorer.

Propeller Clubs

Los Angeles

The third membership meeting of The Propeller Club of the United States, Port of Los Angeles, No. 66, was held at the Jonathan Club, Sixth and Figueroa Streets, Los Angeles, at 12:10 p. m. on Wednesday, February 28, 1940.

There were 40 members and guests present.

The meeting was called to order by the president, **Ralph J. Chandler. David Livingstone,** secretary, acted in his official capacity.

Following the introduction of guests, **Captain Robert Henderson,** U.S.N. (retired), member of the Port, proposed that The Propeller Club, Port of Los Angeles, sponsor one scholarship in the California Maritime Academy, which matter has been referred to the board of governors of the Port of Los Angeles for consideration.

Commander L. L. Bennett, U.S. C.G., director of the Los Angeles section of the U. S. Coast Guard, acted as chairman of the day. The meeting was turned over to him, and he gave a brief resume of the history of the Coast Guard and presented an interesting and educational talking motion picture, "The Story of the Coast Guard and Life at the C. G. Academy."

There being no further business, the meeting adjourned.

Tacoma

The regular monthly dinner and meeting of the Propeller Club, Port of Tacoma, was held Tuesday evening, March 19, at the Tacoma Hotel.

The only business brought before the Club was the matter of the various bills now before Congress which are of vital interest to the Maritime interests. The members were advised of the action taken on the following bills at our last Board of Governors meeting.

Bill S-3075—Pertaining to the sale of American vessels to foreign interests. Our Club went on record as opposing this bill, feeling that the matter should be left to the discretion of the Maritime Commission for their approval.

Wheeler-Lea Bill S-2009—Our Club is against this bill which proposes to regulate water transportation by the Interstate Commerce Commission.

H.R. Bill 7633—Pertaining to a toll of 1c per long ton to be assessed on all freight moving through Government built, owned, and operated locks on all rivers in the United States. Our Club thoroughly endorsed this bill.

H.R. Bill 7094, also H.R. 6136—Relative to State Merchant Marine Academies or Nautical Schools. Our Club is of the opinion that these schools should be operated by the Maritime Commission and that any bill authorizing expenditures toward State Schools should not be endorsed as they would be in direct competition with the Maritime Commission Schools.

Our Club also went on record as opposing the President's recent order to abolish all Custom offices in Tennessee, especially the one in Memphis.

Letters were mailed to all of our State's Senators and Representatives in Washington, D. C., in connection with the above bills, also to the Hon. Schuyler Otis Bland, Chairman of the Merchant Marine and Fisheries Committee, House of Representatives, Washington, D. C.

After the above bills were discussed by the club members, K. M. Kennell was asked to give a report regarding a meeting which was also held in Tacoma on the 19th, attended by the shippers from the Pacific Northwest area, in connection with the startling lack of Intercoastal ship service and its effect on their business. Mr. Kennell stated that attempts would be made to have the Maritime Commission release tonnage which they now have tied up in order to relieve the pressure.

Next on the program was the monthly "Jack Pot," after which President Moore asked Henry Foss to introduce the evening's speaker, E. A. White, manager of the Tacoma Smelter, whose subject was "The Human Side of the Smelter."

Mr. White's talk was especially interesting as he sketched the history of the smelter in Tacoma since its establishment fifty years ago.

At the conclusion of Mr. White's address, President Moore introduced Carl Nordstrom, past-president of the Seattle Propeller Club, who was a visitor at our meeting, after which the meeting was adjourned.

CHAS. C. CRAMP.
Secretary.

Super Survey Steamer

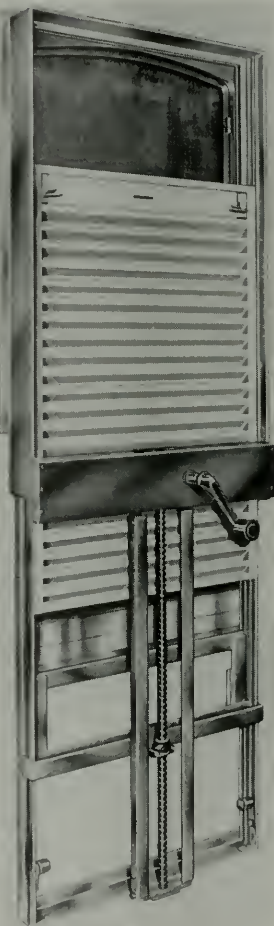
(Continued from page 50)

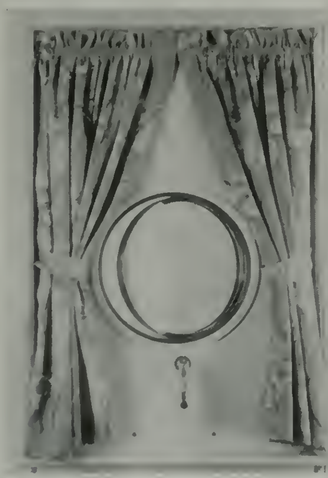
Asia—in a region where it never stops blowing and where summer weather is winter on the U. S. A. Pacific Coast—but in a region where ship and aerial navigation is becoming increasingly important, in a region that will be opened to the world by the groundwork done by the world's finest survey ship, the Explorer.

Special Windows on Explorer

Across the conical front of the deck house, directly below the wheelhouse, the large room for the commissioned officers is lighted by the Kearfott Automatic Pivoted Airport, which is opened and closed without touching any part of it except the crank handle provided for this purpose. No longer need there be danger to passengers in undertaking to open or close airports. Completely under the control of the crank handle, the glass frame is held by the mechanism in any desired position. All that is necessary to open the port is to turn the crank handle to the left; and to close it, turn the crank handle to the right.

If, when the port is closed, the handle is given two or three turns to the left, the glass frame begins to move directly away from the port, but remains parallel to it. Thus the port may be opened slightly, allowing some air to come in, but the opening is still protected from rain or spray. If the handle is turned more to the left, the glass frame begins to swing to one side. When the port is full open, the glass frame is enough to one side to: form an efficient windscoop; allow nearly full view through the opening, and permit escape through the port in an emergency.





In no position can the glass frame be misplaced, or spin, or jam, and from any position the port can be quickly closed water-tight simply by turning the handle to the right.

A circular cover plate, made in two sections, upper and lower, fits between the rubber gasket and the glass holder ring.

Windows in Deck House

Windows in the wardroom and officers' quarters, located in the deck house, are of the Kearfott self-contained unit type, the K-225 weather-tight or K-525 water-tight, depending on location. These are made entirely of bronze with cast window frame, and extruded sections, and felt-lined channels in which the plate glass slides. The glass and screw operating gear are carried on a bronze waistrail. The frames are arched both top and bottom for improved appearance in lining up with the sheer or camber. Copper drip pans are provided with connection for drainage. The weather-tightness of the K-225 windows depends on the tight fit of glass in the felt-lined channels at top and sides, and on the wedge-shaped strip of rubber inserted in the glass holding channel at the bottom of the window, which jambs against the window frame when the window is closed.

The K-525 water-tight window has a rubber gasket inserted on the inboard face of the window frame, and is weathered by four hand levers—two on each side.

Aluminum jalousies or blinds are mounted in felt-lined runners attached to the window frame.

Pilot House Windows

The water-tight K-800 Kearfott-Klearvu windows fitted in the pilot house have two lights of heat-treated glass raised and lowered by hand and held by side catches; the two lights move in the same plane. Side racks for engagement of catches allow for practically any amount of window opening, and have finer adjustments within four inches above and below the normal eye level.

For full opening of window, the top sash is raised clear of the frame opening, and the bottom sash is similarly lowered.

New Orleans Prepares for Convention

Tentative plans for entertainment of delegates attending the national convention in New Orleans, on December 8-11, 1940, of the United States Propeller Club, were discussed at a meeting of chairmen and vice chairmen of local committees named by **President Louis B. Pate** of the New Orleans Propeller Club. While details will not be released prior to submission and approval by the national headquarters, it may be revealed that the New Orleans club has gone overboard in its determination that homeward-bound convention delegates carry memories of a top-notch time in "America's Most Interesting City."

A registration of around 800 is anticipated. Headquarters will be in the Hotel Roosevelt.

Mr. Pate, who serves as general chairman, has named the chairmen and vice chairmen of various committees, as follows:

GENERAL CONVENTION COMMITTEE

Louis B. Pate, General Chairman; Vice-President, Mississippi Shipping Co.

H. R. Iley, Vice-Chairman, Marine Paint and Varnish Co.

FINANCE COMMITTEE

Joseph M. Rault; Terriberry, Young, Rault and Carroll.

George H. Terriberry; Terriberry, Young, Rault & Carroll.

R. E. Tipton; Executive Vice-President, Lykes Bros. Steamship Co., Inc.

Hon. Jess S. Cave, representing Mayor Robert S. Maestri; Honorary Member.

HOTEL AND BANQUET COMMITTEE

E. A. Jimison, Chairman; Lykes Bros. Steamship Co., Inc.

C. A. Palmer, Vice-Chairman; Lykes Bros. Steamship Co., Inc.

GOLF COMMITTEE

Robert Freebairn, Chairman; Todd-Johnson Drydocks, Inc.

J. Kenneth Sadler, Vice-Chairman; Marine Office of America.

EXHIBITS COMMITTEE

Hy C. Dreyfus, Co-Chairman; Suppliers' Div., Neptune Supply Co.

Capt. J. A. Rice, Co-Chairman; Operators' Div., Moore & McCormack S. S. Co.

H. Rodenburg, Vice-Chairman; United Fruit Co.

Capt. H. W. Curtis, Vice-Chairman; Atlantic and Gulf Stevedores.

TRANSPORTATION COMMITTEE

William Gause, Co-Chairman; United Fruit Co.

F. G. Prat, Co-Chairman; Standard Fruit and Steamship Co.

M. D. Rich, Vice-Chairman; New York and Puerto Rican S. S. Co.

Spencer Tallmadege, Vice-Chairman; W. G. Coyle & Co.

C. A. Palmer, Treasurer, Lykes Bros. Steamship Co., Inc.

J. W. Richards, Secretary, Mississippi Shipping Co.

Joseph W. Montgomery, United Fruit Co.

N. O. Pedrick, President, Mississippi Shipping Co.

C. A. Sporl, Jr., C. A. Sporl, Inc.

F. G. Prat, Standard Fruit and Steamship Co.

ENTERTAINMENT COMMITTEE

S. V. Massimini, Chairman; Gulf Engineering Service and Speciality Co.

J. A. Laing, Vice-Chairman; Surveyor.

RECEPTION COMMITTEE

Joseph M. Rault, Chairman; Terriberry, Young, Rault & Carroll.

William McCardell, Vice-Chairman; U. S. Maritime Commission.

William Wishart, Vice-Chairman; American Bureau of Shipping.

REGISTRATION COMMITTEE

George R. Hammett, Chairman; A. M. Lockett & Co., Ltd.

Capt. H. A. Johnson, Vice-Chairman; Seaman's Church Institute.

PUBLICITY COMMITTEE

F. E. Ames, Chairman; Lykes Bros. Steamship Co., Inc.

J. O. Chamberlain, Member, Port Bulletin.

W. J. Krebs, Member, News Correspondent.

L. Guerin, Member, New Orleans Item.

J. Gillis, Member, New Orleans Times-Picayune.

New Executives for American Locomotive

Wm. C. Dickerman

William Carter Dickerman, recently appointed chairman of the board, American Locomotive Co., was born on December 12, 1874, at Bethlehem, Pa. Following his graduation from Lehigh University in 1896, he entered the employ of the Milton Car Works, Milton, Pa., where he served successively in the auditing, purchasing and engineering departments. In 1899, on formation of the American Car and Foundry Co., of which the Milton Car Works became a part, he was appointed assistant manager of the Milton, Pa., district. Transferred to New York in 1900, he was appointed sales agent, and later general sales agent, which position he held until 1905, when he was appointed vice-president. During the war Mr. Dickerman was in charge of the American Car and Foundry Co. division which successfully executed munition contracts on behalf of the United States and the allied nations, and in 1919 he became vice-president in charge of all operations of the company.

In 1929 Mr. Dickerman was elected president of the American Locomotive Co., which position he held until his recent appointment as chairman of the board.

D. W. Fraser

Duncan W. Fraser, recently appointed president of the American Locomotive Co., was born in Pitcou County, Nova Scotia. He served his apprenticeship at the Rhode Island Locomotive Works. In 1904, when the American Locomotive Co. acquired the Montreal Locomotive Works, Ltd., he was transferred to the Montreal Works, where he served in various capacities until he became works manager, and later managing director of the company. In 1920 he was appointed vice-president of the American Locomotive Co., with headquarters in New York. In 1924, he became a director, and in 1939 a member of the executive committee. Mr. Fraser retained his position as vice-president until February 29, 1940, when he was appointed president, succeeding William C. Dickerman, who on that date was appointed chairman of the board.

Robt. B. McColl

Robert B. McColl, recently appointed vice-president, Manufacturing, American Locomotive Co., became attached to the New York office of the company in January, 1922; the following June, was appointed assistant manager of the Schenectady plant; and in January, 1925, manager of the plant. In 1931, he was elected president and director of the McIntosh & Seymour Corporation, Auburn, N. Y., a division of the American Locomotive Co., and when the former was merged with the parent company, Mr. McColl was appointed vice-president of the American Locomotive Co., diesel engine division. In 1936, he was elected president of Alco Products, Inc., a division of the American Locomotive Co., and later, when Alco Products, Inc., was merged with the parent company, he was appointed vice-president of the American Locomotive Co., Alco Products Division, which position he held until his present appointment.

New Pipe Flange Jack

Replacing gaskets in flanged pipe lines has always been a hard job, but now comes the Garlock Packing Company with a very handy jack which enables any mechanic to do this job in a very easy way.

As shown in the illustration, this tool comprises a pair of forged steel jaws and a steel screw with case-hardened point. For opening a flanged joint a pair of jacks are necessary.

With Flange-Jacks, joints are opened quickly even when the working space is cramped or limited. Flange faces will not be damaged, there will be no sparks caused by hammer blows on chisels or wedges, and no resulting vibration in the pipe line. As the jackscrews are tightened the flanges are separated gradually and evenly.

After the new gasket has been applied, the joint is closed just as easily as it was opened. Bolt holes are in perfect alignment and gasket properly positioned. There are no wedges to fly, and no jerking of the pipe, which frequently causes leaks at other points.

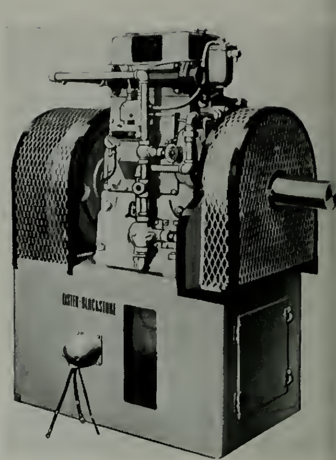
Flange-Jacks are high grade tools, strong and sturdy, yet simple in design. The jaws are heavy one-piece steel forgings capable of withstanding tremendous pressure. In repeated laboratory tests Flange-Jacks have easily opened joints against a load of 15 tons, without damage to the jacks or to the flanges.

A Space-Saving Diesel Electric Power Plant

"Powr-Pak," a new line of diesel-electric power plants, ranging in size from 3,600 to 24,000 watts and built to a simple, yet revolutionary space-saving design, is now being placed on the market by Lister-Blackstone, Inc.

These new plants consist of engine fitted with water circulating pump, generator and control panel, all assembled in compact form, ready to set in place and put to work. Chief change from conventional design is in the placement of the generator, which sits directly underneath the engine and thus cuts floor space requirements almost in half.

Power for generating is supplied by the famous Lister 4-cycle diesel engine using Bosch fuel systems. To assure long engine life, the cylinder walls are chromium impregnated by the Listard process. The patented dual-compression system used on Lister diesels makes starting by hand easy under all temperature conditions.



Generators are available in any desired voltage or current, either D.C. or single- or three-phase A.C., for stationary or marine service.

In addition to generating plants, a complete line of combination marine auxiliary units is available, consisting of any desired combinations of generators, air compressors and pumps, in sizes from 6 to 40 H.P.

Trade Literature

Increase Fishing Profits is the title of an interesting and colorful four-page brochure recently issued by the Farrel-Birmingham Company, Inc. This booklet shows how the substitution of two new high-speed diesels connected to the propeller shaft of the trawler Vagabond through Farrel-Birmingham reduction gears in place of one old direct-drive engine accomplished the following remarkable results:

50% more power;
20% more boat speed;
60 % more cruising range;
25 % less first cost;
30 % less operating cost;
50 % less maintenance; and
57 % less weight.

Twin Launching At Federal

(Continued from page 49)

launched first, and the Kearny slid down the ways twenty minutes later.

Mrs. Charles P. Plunkett of Rockville, Maryland, wife of the late Rear Admiral Charles P. Plunkett, christened the first ship, named in honor of her husband.

U. S. S. Kearny was named in honor of the late Commodore Lawrence Kearny, and was christened by Miss Mary Kearny of Richmond, Virginia, his first cousin three times removed.

Appointed to the Naval Academy in 1879, Admiral Plunkett served as a lieutenant (junior grade) in the battle of Manila Bay on the U. S. S. Petrel, attached to Admiral Dewey's squadron. In July, 1918, he was in command of the United States Naval Railway Battery in France. This battery was composed of five fourteen-inch battleship guns on mobile mounts, and was engaged with the French and American armies from September 6 until the Armistice. These were the most powerful artillery units used by the Allies on the Western Front.

Following the war, Rear Admiral Plunkett commanded the destroyers of the Atlantic fleet; was appointed Chief of Staff of the Naval War College; became president of the Navy Department's Board of Inspection and Survey; and was Commandant, New York Navy Yard and Third Naval District, from 1922-1928. He died in Washington, D. C., on March 24, 1931.

Commodore Lawrence Kearny, United States Navy, was born in Perth Amboy, New Jersey, in 1789; was appointed midshipman on July 24, 1807; cruised in West Indian waters in search of pirates and slave traders from 1818 to 1823; was in command of the U. S. S. Warren in the Mediterranean in 1827; and commanded the East Indian squadron from 1841-1844, protecting American interests in China.

He was quite a diplomat, and is credited with opening of China to American commerce, and preventing the cession of the Hawaiian Islands to Great Britain. He died in 1868.

Commission Sells Lines

The Maritime Commission on March 7 turned over to private operation the last Government-owned and operated steamship service in foreign trade. It accepted the bid submitted February 14 by American Mail Line of Seattle for purchase of the trade name and good will of the Puget Sound Orient Line and the bareboat charter of its six vessels, as follows:

Name of Vessel	Charter Rate per Month
S.S. Capillo	$2,880.00

(Page 66, please)

Taken on the trial-run day as these men watched the beautiful Explorer, our photographer presents Comm. A. M. Soberalski, Chief Greer, Geo. Nickum (architect), and Mr. McLaughlin (chief engineer for the architects).

Commission Cadet System

(Continued from page 52)

Training Program will provide approximately ten per cent of the necessary yearly junior officer replacements in ocean and coastwise shipping. About 65 per cent of these replacements will be filled by the promotion of unlicensed seamen who have demonstrated ability and passed the examinations of the United States Bureau of Marine Inspection and Navigation. The other 25 per cent will be made up of graduates of the four state nautical schools (now existing in New York, Pennsylvania, Massachusetts and California). The scholastic and physical requirements for cadet appointments are of a standard comparable with those of the United States Naval and United States Coast Guard Academies. Cadets must be not less than 18 nor more than 25 years of age on July 1, 1940, and must be unmarried American citizens who can produce evidence of good moral character.

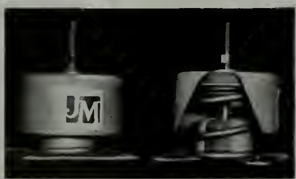
Potential needs of the American Merchant Marine are expected to exhaust this list of eligibles within a year. The Commission will announce another examination when it becomes necessary for the filling of probable vacancies. As of March 1, 1940, there were 298 cadets and cadet officers enrolled in the Commission's system and in the training aboard American ships operating in foreign trade. Cadets receive $50 a month pay with subsistence and quarters.

Placement as licensed officers, after the four-year course of training as cadet, the third year of which will be at shore school, and examination required by the Bureau of Marine Inspection and Navigation, Department of Commerce, is dependent upon personal qualifications and attendant conditions of employment. Many on completion of course will be promoted to cadet officers, the grade between cadet and licensed officer position. Cadet officers are enrolled in the United States Naval Reserve.

New Vibration Isolator

A new, easily-installed vibrator isolator, designed to control machine vibration economically and reduce the resulting noise, was recently announced by Johns-Manville. This device, known as the J-M Controlled Spring Isolator, was developed for use on the bases of motors, generators, pumps, ventilating fans and similar equipment where vibration and excessive motion create noise and tend to wear out machine parts and damage connections as well as crack the supporting walls and floors.

The working parts of the unit consist of a coil spring and a rubber load pad, which support the equipment and isolate vibration, and an adjustable rubber snubber inside the base, which controls excessive motion. Through the combination of these parts, the manufacturer states, the isolator provides both the high compliance necessary for good isolation and the control



needed to limit motion in the equipment.

Built to take care of horizontal and torsional as well as vertical vibration tests indicate the isolator to be particularly efficient for the low-frequency vibrations resulting from slow speeds and from many operations involving reciprocal action. It is made in two sizes: Light Duty, for loads from 60 to 190 lb. per isolator; and Heavy Duty, for loads from 250 to 720 lb. per isolator. Heavy machines may be isolated by clusters of the units. The loaded overall dimensions of the isolator are 6" x 6" by approximately 3¾" high. It is enclosed in a metal jacket, which protects the rubber parts from oil and light.

A New Flow-Measuring Device

The Cochrane Corporation announces a new type of meter, the Linameter, which is adapted particularly to the measurement of fluids having characteristics of viscosity, corrosiveness and solubility, such as fuel oil, ammonia or hot tar, which are beyond the scope of the conventional orifice-type flow meter.

This new meter is of the area type, with meter body installed as an integral part of the pipe line and containing a weighted disk positioned by the velocity of fluid through a tapered throat section in such a manner that the disk travel is directly proportional to flow rate. Attached to the weighted disk are a rod and iron core, the latter of which traverses the field of two reactance coils surrounding the pressure-tight tube of the meter body. These coils form a reactance bridge when connected electrically to similar coils in the indicating, recording and integrating instrument, and form the means of transmitting the measurement to any desired distance from the meter body. Measurement is accomplished in the recording instrument by use of the galvanometer null principle, as applied to the Cochrane Electric Flow Meter.

Among the features which distinguish the Cochrane Linameter are omission of U-tubes, mercury and pressure connecting lines; uniformly graduated indicator and chart scales; reliable integration; means of conveniently changing capacity range; wide range of available capacities; negligible pressure loss; ability to locate the meter body against adjacent valves and fittings without the necessity of straight pipe runs; and high accuracy at both high and low percentage scale readings.

The meter is made in different combinations of indicating, recording and integrating features to suit particular conditions, and may be equipped with pressure and temperature elements to record on the same chart with flow. Styles are available for wall, column or flush panel mounting.

Steady As You Go!

(Continued from page 47)

time, of bad quality, unfit for use, or deficient in quantity. Such officer shall thereupon examine the provisions or water, or cause them to be examined; and if, on examination, such provisions or water are found to be of bad quality and unfit for use, or to be deficient in quantity, the person making such examination shall certify the same in writing to the master of the ship. If such master does not thereupon provide other proper provisions or water, where the same can be had, in lieu of any so certified to be of a bad quality and unfit for use, or does not procure the requisite quantity of any so certified to be insufficient in quantity, or uses any provisions or water which have been so certified as aforesaid to be of bad quality and unfit for use, he shall, in every such case, be liable to a penalty of not more than $100, and upon every such examination the officers making or directing the same shall enter a statement of the result of the examination in the logbook, and shall send a report thereof to the district judge for the judicial district embracing the port to which such vessel is bound, and such report shall be received in evidence in any legal proceedings.

If the officer to whom any such complaint in regard to the provisions or the water is made certifies in such statement that there was no reasonable ground for such complaint, each of the parties so complaining shall forfeit to the master or owner his share of the expense, if any, of the survey.

Problems Answered

(Continued from page 45)

which will always trip at calibrated temperature after years of inactivity in the presence of humidity, dust, corrosion and other effects which render delicate devices inoperative.

A very reliable device consists of a hermetically-sealed electric contact closed by a heavy spring but held normally open by a quartz glass bulb or sealed bottle, as is used in the Grinnell sprinkler head. Their bulb is filled nearly full with a liquid which boils at the required temperature and breaks the bulb. This releases the spring, closing the contact.

(2) In the electro-pneumatic system, the sensitive heads in the living quarters and staterooms consist of a copper or metallic dome-shaped fixture. This is connected with a small copper to a silphon bellows in the indicator cabinet. The system is inert gas-filled and sealed off. Increase in temperature causes increase in gas pressure, expanding the bellows, tripping closed a contact. This drops an annunciator in the indicator cabinet in the chart or wheelhouse, giving location of the fire. A bell alarm also sounds.

The electric type is similar, differing only in that the sensative element is mechanical in action, using bi-metallic strip of metal coiled up. Increase of temperature causes it to uncoil and turn a contact arm around to make electrical contact. In general, it differs in making the electric contact in the thermostat, and several are connected to one line and one drop in the annunciator, which then indicates the zone or area, and the fire must be located in this area.

The smoke detector system is a third type. Here small pipes run from each cargo hold and enclosed space to a box or manifold. By means of small exhaust fans, air is pulled up through these pipes into the box, which, being lighted, shows when smoke or vapor comes out. This locates a fire immediately. By means of the photo-electric tube or electric eye, an alarm is sounded when smoke appears in the box, calling attention to the fire at once.

Deck Officers' Licenses for February

Name and Grade	Class	Condition
SAN FRANCISCO		
C. W. Encell, Master	SS, MS, any GT	RG
S. F. Halvorsen, 2nd Mate	SS, any GT	RG
T. F. Gresham, 2nd Mate	SS, any GT	O
H. E. Romagosa, 3d Mate	SS, any GT	O
R. C. Harriss, 3d Mate	SS, any GT	O
W. J. Carey, 3d Mate	SS, any GT	O
SAN PEDRO		
S. E. Jorgensen, Chief Mate	SS, any GT	RG
H. Johnson, 2nd Mate	SS, any GT	O
A. B. Trucks, 3d Mate	SS, any GT	O
SEATTLE		
O. E. O!sen, Master	SS, any GT	RG
V. T. Burt, 3d Mate	SS, any GT	O

Engineers' Licenses for February

SAN FRANCISCO		
W. C. Vortmann, Chief	SS, any GT	RG
H. Hawkinson, 1st Asst.	SS, any GT	RG
W. R. Wyllie, 1st Asst.	SS, any GT	RG
L. G. Miller, 1st Asst.	SS, any GT	RG
D. Hanna, 2nd Asst.	SS, any GT	RG
C. B. Blair, 2nd Asst.	SS, any GT	RG
F. L. Hollingsworth, 2nd Asst.	SS, any GT	O
J. H. McCulloch, 2nd Asst.	SS, any GT	O
W. P. Manuell, Chief	MS, any GT	O
H. Hawkinson, 1st Asst.	MS, any GT	O
SAN PEDRO		
C. B. Strand, 3d Asst.	SS, any GT	O
P. S. Inlow, 1st Asst.	MS, any GT	RG
SEATTLE		
G. F. Gains, Chief	MS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

At the outfitting dock, Newport News Shipbuilding and Dry Dock Co., the after funnel of S. S. America as seen from the crane which has just spotted it on the deck.

Commission Sells Ships

(Continued from page 61)

S.S. Coldbrook	2,885.40
S.S. Collingsworth	2,885.40
S.S. Satartia	2,880.00
M.S. Crown City	3,170.38
M.S. West Cusseta	3,170.38

The bid was accepted subject to the following conditions:

(1) That all earnings over and above the 10 per cent return on capital necessarily invested in the business be deposited in the capital reserve fund until such time as the Commission elects otherwise.

(2) That deposits in the capital reserve fund be applied to the purchase of replacement vessels under Title V (Merchant Marine Act, 1936) when and as such deposits aggregate the required minimum down payments, after making provisions to meet mortgage payments maturing during the ensuing twelve months' period.

(3) That the bidder shall agree to place in service newly-constructed replacement vessels whenever they may be made available by the Commission.

In addition to the Puget Sound service, the Commission has during the past fourteen months transferred to private operation the American Republics Line, the America France Line, the American Hampton Rhodes-Yankee Line, the Oriole Lines and the India, Far East and Australian services of the American Pioneer Line.

These transactions, which were completed through competitive bidding, have assured the investment by private capital of a very substantial amount in new tonnage sorely needed by the American merchant marine. In each case the operator acquiring the Government lines agrees with the Commission to substitute new ships recently completed or now under construction for the old vessels at present in service.

To date the private operators who have acquired these lines are committed to the introduction of 32 new vessels, of which 18 are to be purchased outright and the balance taken under bareboat charter. These vessels represent a construction cost of approximately $75,000,000.

Trials and actual service of new vessels being constructed under the Commission's program have demonstrated that they are among the most efficient, economical and safest merchant vessels afloat today.

Flexible Shaft Portable Machines

While the trend of modern industry is to multiple standardized manufacture, in which special machine tools are set up for turning out parts on a production basis, still there are many uses for power operations that can be most economically applied on the assembly or erection process and on repair and reconditioning work. In these applications the portable machine and the flexible shaft are supreme.

Some of the operations in which this type of machine are found very economical and useful helpers are:

(1) In the abrasive processes, such as grinding, polishing, buffing, sanding and filing; and

(2) In light machine work, such as drilling, reaming, nut setting, screw and driving.

N. A. Strand & Company of Chicago manufacture a complete line of portable machines, flexible shafts and attachments that fairly cover all the usual applications of this type of machinery. Their line includes sixty types and sizes, using ⅛- to 3-H.P. motors, and fifty attachments to cover various applications. These machines are carried in stock by several Pacific Coast distributors.

Wire Rope Clamp Approved

The "Safe-Line" wire rope clamp, described in a previous issue, has been granted the approval of the Underwriters' Laboratories, Inc., for use on the strongest of wire ropes. It is claimed by the manufacturers of the clamp that an approval of this sort has never before been obtainable where a clamp is used to form and hold a loop.

The tests necessary to obtain this approval were very exhaustive, and consisted of both tension and vibration tests of numerous sets of samples.

These samples were assembled by both the laboratory employees and the manufacturer, and the ease of assembly was commented upon in the summary of the report. The shielding of the sharp ends of the wire rope to prevent personal injury is obvious, and permits free and safe handling of the rope.

Artist's conception of C-3 combination passenger and cargo vessel for United States Lines, four of which are on order at the Ingalls Shipbuilding Corporation, Pascagoula, Miss.

Building in American Yards

Direct Reports from Yards as of March 1, 1940.

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Keel for first ship laid January 19, 1940.

One pineapple barge 175′ x 45′ x 11′; 650 gross tons; for Young Brothers, Ltd., Honolulu, T. H. **Completion date March 4, 1940.**

DRYDOCK AND ROUTINE REPAIRS:

Vitus Bering, Union Oil Barge 1922, Admiral Y. S. Williams, Tug Mamo, F. H. Hillman, American Fisher, M. S. Sveaborg, Knud Rasmussen, Condor, Peter Lassen.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 40-foot sloop.

One 55-foot ketch-rig yacht.

DRYDOCK AND ROUTINE REPAIRS:

Stella Maris, Aafje, Blue Moon, Los Cerritos, Branta, Sally, Linde, Vashon, Torqua, Eskimo; 47 smaller commercial and pleasure boats.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of 5th Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Davenport, W. R. Chamberlin, Jr., Noyo, Columbine, Esther Johnson, Tug Falcon, Tug Reliance, W. P. Carfloats Nos. 1 and 2, Dredge San Pedro, Kewanee.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION: **200 foot steam geared turbine steel survey ship Explorer for U. S. Coast & Geodetic Survey.** Launching date, October 14, 1939; **delivery date, March 9, 1940.**

4750-bbl. steel oil barge for Standard Oil Co. of Calif.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Cascade, Montebello, A. O. Barge No. 8, Josephine Lawrence, Baldhill, M. S. Iselin, Watsonville, Yacht Machigonne, M. S. Hallanger, J. J. Coney.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Covered lighter (YF-259); launched February 5, 1940; **completed February 15, 1940.**

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Concord, Savannah, McFarland, Cushing, Perkins, Preston, Smith, Kilty, Kennison, Rathburne, Dent, Waters, Talbot, Meade, Swasey, Thatcher, Shubrick, Aulick, Edwards, McLanahan, Laub, Bagaduce, Tippecanoe, Trinity, Shoshone, Henderson, Bridge, Salmon, S-27, S-28.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; **LOA 492′ 0″, LBP 465′,** breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195 launched September 15, 1939; No. 196 launched December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″. Keel laid, No. 197, February 5, 1940.

DRYDOCK AND ROUTINE REPAIRS:

R. J. Hanna, Silverbelle, Velox, Cuzco, Willmoto, Oregonian, Pacific Pioneer, Carmar, Yukon, Ohioan, Missourian, Thorsholm, Tarakan, Pacific Star, Arcata, Maunalei, Admiral Wood, Bering, Capt. A. F. Lucas, Silveray, Mapele, Ruth Freese, West Cactus, San Diego, Iowan, Solana, J. C. Fitzsimmons, Rialto, Willapa, Oduna, Humaconna, Manoeran.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Woban (YT138). Launched November 6, 1939; **commissioned February 15, 1940.**

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:

Enterprise, Mississippi, New Mexico, Oriole, Williamson.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Iroquois, Umatilla Reef Lightship No. 93, Heffron, Capac, North Haven, Hollywood, Depere, Coldbrook, Brookings, Walter A. Luckenbach, K. I. Luckenbach, Siranger, Barge Drummond Dry Dock, West Ivis, Cuzco, Chippewa, Diamond Cement, Florence Luckenbach, Washington Express, Robert Luckenbach.

SEATTLE-TACOMA SHIPBUILDING CORP.
1801-16th Ave., Southwest
Seattle, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two Hooven-Owens-Rentschler 2,100-H.P. diesels; 14 knots speed. Keel laying dates, March 5, May 15, November 10 and December 10, 1940; and April 10, 1941. Launching dates, October 20 and November 20, 1940; and March 20, May 20 and August 20, 1941. Delivery dates, March 8, May 7, July 6, September 4 and November 2, 1941.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, purse seine fishing vessel 100′ x 26′. Launched March 26, 1940.

Hull No. 142, purse seine fishing vessel 93′ x 24′. Launching date April 15, 1940.

Hull No. 143, purse seine fishing vessel 94′ x 25′. Keel laid April 1, 1940.

DRYDOCK AND ROUTINE REPAIRS: Tugs Irene and Falcon; Seiners Clipper, New Oregon and Helen B.; Trollers Friendship and Falcon; Sound Freight and Passenger Vessel Concordia.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. Keel laying dates, February 5, February 19, July 1, November 10, 1940; and March 1, 1941. Launching dates, June 5, August 31, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Six oil barges 195′ x 35′ x 10′ for Socony-Vacuum Oil Co.

Twenty coal barges 175′ x 26′ x 11′ for Carnegie-Illinois Steel Co.

THE AMERICAN SHIP BUILDING CO.
Cleveland, Ohio

DRYDOCK AND ROUTINE REPAIRS: Carle C. Conway, L. E. Block, Standard Portland Cement, Martha Allen, M. E. Farr, Candoil. LORAIN PLANT: Carle C. Conway, Carl D. Bradley. CHICAGO PLANT: Mercury.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Delivery dates June and August, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Delivery dates, June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

CV7, Wasp, Airplane Carrier for U. S. Government. Launched April 4, 1939.

Hulls Nos. 1470 and 1471, two 1500-ton destroyers for U. S. Government; No. 1470 launched November 15, 1939.

Hulls Nos. 1476 and 1477, two freight vessels for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′3″; 16½ knots; geared turbines and water tube boilers. No. 1477 keel laid July 27, 1939. No. 1476 launched December 28, 1939.

Hull No. 1478, Massachusetts; 35,000 ton battleship for U. S. Navy.

Hulls Nos. 1479 and 1480, two 6000-ton cruisers for U. S. Government.

Hulls Nos. 1481-1484, four freight vessels; 450′ BP. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4329, Platte; 4330, Esso Annapolis; 4331; three 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. No. 4329 launched July 8, 1939. No. 4330 launched September 9, 1939. No. 4331, keel laid September 18, 1939.

Hulls Nos. 4337, Delbrasil; No. 4338, Delorleans; and No. 4339, Delargentino; three passenger and cargo ships for Mississippi Shipping Co. Launching dates, No. 4337, December 16, 1939; No. 4338, February 17, 1940. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, Victor H. Kelly, tanker for Union Oil Co. of Calif. Contract signed May 1, 1939. Launched January 6, 1940.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8002, Seminole; and 8003, Cherokee—two U. S. Navy fleet tugs. No. 8002 launched September 15, 1939; delivery date March 7, 1940. No. 8003 launching date November 10, 1939; delivery date May 1, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100′ x 25′ x 12′; 805 H.P. Fairbanks-Morse engine. Delivery date May 1, 1940.

Two wooden deck scows 118′ x 36′ x 10′ for builder's account. Delivery dates March and May, 1940.

Two steel tugs 90′ x 23′ x 10′; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery dates August and September, 1940.

DRYDOCK AND ROUTINE REPAIRS: Ferryboat Major General William H. Hart.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170′ Delivery date June, 1940.

Hull No. 167, sub-chaser PC-452, length 174′, for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1570-1572, three welded flush deck cargo box barges 130′ x 30′ x 7′ 6″ for stock; 750 gross tons.

Hulls Nos. 1624-1628, five welded steel coal barges 134′ x 34′ x 17′ for stock; 3835 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1653-1656, four welded steel carfloats 330′ x 40′ x 11′ for Long Island RR, Philadelphia, Pa.; 5212 gross tons.

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135′ x 26′ x 8′ for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hulls Nos. 1675-1677, three welded covered cargo barges 175′ x 26′ x 11′ for Mountain City Mill Co.; 1590 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80′ x 30′ x 9′ for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250′ x 34′ x 9′ 1″ for Pennsylvania R.R.; 5940 gross tons.

Hulls Nos. 1706-1711, six type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 2832 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135′ x 27′ x 11′ 9″ for Semet Solvay Company, 290 gross tons.

Hulls Nos. 1713-1715, three welded steel oil barges 195′ x 35′ x 9′ 6″ for Latonia Refining Co., Cleveland, O.; 1746 gross tons.

Hull No. 1716, one welded steel derrick boat hull 66′ x 40′ x 6′ 6″ for McLean Contracting Co., Baltimore, Md.; 163 gross tons.

Hull No. 1717, one welded steel derrick boat hull 100′ x 36′ x 7′ for Anthony O'Boyle, Inc., N. Y. C.; 220 gross tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 159, Comet; C-2 cargo vessel for U. S. Maritime Commission. Launched December 16, 1939.

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. **Launched March 9, 1940.**

Hulls Nos. 162, Sea Fox; 163, Sea Hound; 164, Sea Panther; 165, 166 and 167; six C-3 cargo vessels for U. S. Maritime Commission. Keels laid, No. 165, November 13, 1939; No. 166, March 4, 1940. **Launching dates.** No. 162, January 27, 1940; No. 163, February 24, 1940; **No. 164, April 6, 1940.**

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission. Keel laid, No. 172, January 22, 1940.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J. Keels laid December 26, 1939.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels. Contract date September, 1939.

Hull No. 271, ferryboat for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.: 105′ x 35′ x 5′. **Completion date April 1, 1940.**

Hulls Nos. 272 and 273, two flat deck barges for West Virginia Pulp & Paper Co., N. Y., N. Y.; 105′ x 32′ x 7′. **Completion date March 1, 1940.**

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147′ x 35′ x 7′ 6″. Estimated completion date, August 1, 1940.

Hulls Nos. 275-276, two oil barges, 93′ x 36′ x 10′ 6″, for Panama Canal, Washington, D. C. Estimated completion date, May 11, 1940.

Hull No. 277, derrick barge 80′ x 38′ x 6′ for Doullut & Ewin, New Orleans, La. Estimated completion date May 15, 1940.

Hull No. 278, mooring barge 100′ x 30′ x 5′ for Standard Oil Co. of Ind., Chicago, Ill. Estimated completion date May 12, 1940.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80′, beam OA 22′ 7″, depth 9′ 6″. Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. **Delivery date March, 1940.**

One all-welded twin screw automobile and passenger ferry; 132′ LOA, 43′ 8½″ beam and 10′ deep; for Venezuela interests. Powered with two 200 H.P. Atlas diesel engines. **Delivery date March, 1940.**

Four all-welded unmanned barges 173′ x 39′ x 8′ 6″ for Pan American Refining Co. **Delivery date April, 1940.**

One steel single-screw diesel tugboat 70′ x 19′ x 8′ for Pan American Refining Co.; 450 B.H.P. **Delivery date, March, 1940.**

One electric ferry 185′ 2½″ x 55′ x 15′ 6″ for Electric Ferries, Inc. Powered with 950-H.P. General Motors diesel with one 750-H.P. propelling motor. **Delivery date, April, 1940.**

Two all-welded unmanned barges 173′ x 39′ x 8′ 6″, for Higman Towing Co., Orange, Texas. **Delivery date March, 1940.**

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406′ x 57′ x 23.5′. Approximate dates, **keel laying, March 27, 1940;** launching date, September 15, 1940; delivery date, January 4, 1941.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723′, beam 92′, depth 45′. Launched August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keel laid, No. 372, February 5, 1940. Launching dates, No. 370, September 29, 1939; No. 371, January 26, 1940.

Hulls Nos. 375 and 376, two single screw cargo vessels for United States Maritime Commission; turbine propulsion; gross tonnage about 8000 tons; length 435′, breadth 63′, depth 40′ 6″. Launching dates, No. 375, October 18, 1939; No. 376, December 15, 1939. **No. 375 delivered February 15, 1940.**

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 9100 tons. Keels laid, No. 379, October 2, 1939; No. 380, November 3, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″; gross tonnage about 9100 tons.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy. Launched December 9, 1939.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp; 1600 gross tons; 300′ x 65′ x 20′; steam UnaFlow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. Delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413′ x 60′ x 37′ 6″; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95′ 6″ x 24′ x 14′ 9″; steam UnaFlow propulsion; 600 H.P.; 13-knots speed; cost $200,000. Delivery dates July and August, 1940, respectively.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 184-185, two single-screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery dates April** and **May, 1940.**

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates April, May, June and July, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. Keels laid July 28 and August 17, 1939; **delivery dates April 15, 1940,** and June 1, 1940.

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date December, 1940.

Hull No. 194, one tanker for Atlantic Refining Co.; 19,400 tons. Delivery date May, 1940.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 1,800 tons. Delivery date 1940.

Hull No. 196, one tanker for Lima Oil Co.; 1,800 tons. Delivery date 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date 1940.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

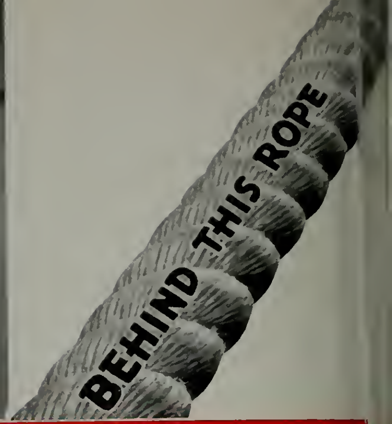
NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered. Launching dates, No. 33, October 31, 1939; No. 34, January 10, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons.

PACIFIC MARINE REVIEW

MAY
1940



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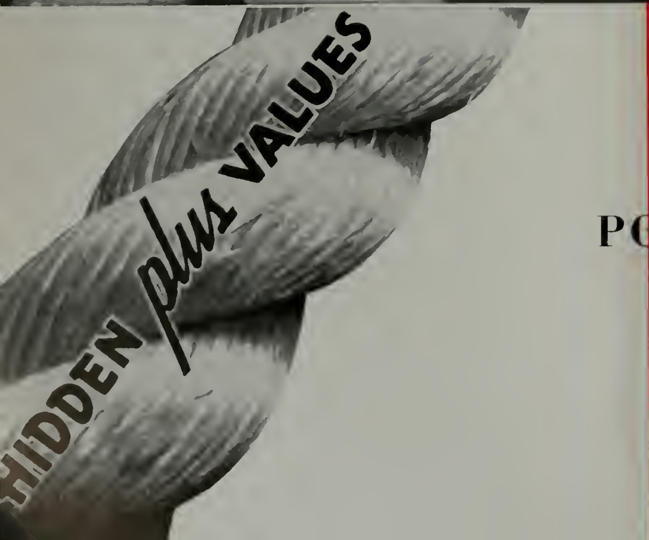

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PACIFIC MARINE REVIEW

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PACIFIC MARINE REVIEW

MAY
1940

The Shipbuilding Program
And the American Merchant Marine

President H. Gerrish Smith of the National Council of American Shipbuilders, in his annual report dated April 18, emphasized the important part now being taken by the American shipbuilding industry during these critical times of international emergency. The privately-owned shipbuilding plant of the United States has now on hand a larger volume of mercantile and naval shipbuilding than at any other time during its history, with the exception of the fiscal years 1918, 1919, 1920.

As of April 18, the Maritime Commission program of ship construction had involved 147 vessels, of which 30 had been delivered. This leaves 117 under construction or on order, of which 13 had been launched. In addition to this Commission program, there were in American shipyards, building or on order solely for private account, 32 seagoing vessels, aggregating 325,000 gross tons.

According to the April 1 report of the American Bureau of Shipping, there were in American shipyards, on order or under construction, 148 seagoing vessels of 1,219,210 gross tons that were under classification by that Bureau, plus 4 not classified, aggregating 33,900 gross tons. This makes as of April 1 a total of 152 vessels, aggregating 1,253,110 gross tons.

In non-seagoing classifications, there are under construction in shipyards 113 vessels, aggregating 58,873 gross tons. All of this adds up to a grand total of 265 vessels and 1,311,983 gross tons.

Comparing this total under order or construction with the totals delivered in former fiscal years, we find that 1919 deliveries totaled 1,933,509 gross tons; those for 1920, 1,832,382 gross tons; and those for 1921, 1,252,713 gross tons. The highest year in deliveries since 1921 was 1927, with 297,958 gross tons.

Comparisons, of course, do not mean much unless all of the contributing factors can be properly measured. However, here is one that is rather striking. One American Atlantic Coast shipyard has today under construction or on order a larger tonnage of seagoing merchant vessels than has been delivered by the entire shipbuilding plant of the United States in any one year since 1921.

Another interesting feature of the above figures is that the now under construction or on order strictly for private account vessels outside of the ten-year program of the Maritime Commission aggregate a gross tonnage much in excess of the total delivered in any one year since 1921.

With these facts in mind, we now turn to an analysis of the present active merchant marine fleet of the United States, as set forth by the April report of the American Bureau of Shipping.

Table I (page 32) indicates the classification of this fleet by tonnage groups and by services. Other figures from the same report give the average ages of the service groups as: passenger vessels, 20.4 years; general cargo carriers, 21 years; tankers, 17.5

years; bulk cargo carriers, 23.7 years; ferries, 15 years; and miscellaneous, 31.7 years. It is evident that considerably over 50 per cent of the entire fleet of nearly 8 million gross tons is over age if we take the accepted limit of 20 years' active service for a steel ship.

Tables II and III segregate the fleet as to type of machinery by tonnage groups and by service groups, respectively. These tables bring out the very interesting fact that nearly two-thirds of the fleet are equipped with reciprocating steam engines and Scotch fire tube boilers. Practically all such plants are for operating pressures around 200 lbs. From the standpoints of fuel economy, of weight, and of space occupied, they are obsolete.

Another factor which vitally affects this picture is the sale of American-flag tonnage to foreign-flag ownership and registry. The effect this is having on American intercoastal services is graphically shown in a statement compiled by the Los Angeles Chamber of Commerce and reproduced herewith. Note that practically all of the change occurred during the month of March. The rate of sale of tonnage foreign is still increasing. This has led to legislation enabling the Maritime Commission to sell o charter its laid-up ships to take car of the emergency.

Any of these vessels that ar chartered or sold for American intercoastal operation will, of course

NUMBER AND TONNAGE OF EXISTING SELF-PROPELLED VESSELS OF THE UNITED STATES OF 2,000 GROSS TONS AND OVER

(As of April 1st, 1940)

Arranged according to Gross Tonnage and Type

(Excluding Great Lakes, Philippine Island and Government Owned Vessels)

Tonnage Group	Passenger		Cargo		Tankers		Bulk Carriers		Ferries		Miscel.		Total	Total Gr.
	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons	Vessel	Tonnage
2000— 3000	24	57,511	100	252,069	7	18,044	6	14,415	21	47,864	1	2,316	159	392,219
3000— 4000	15	51,496	83	278,901	6	21,031	7	24,528	—	—	1	3,180	112	379,136
4000— 5000	21	98,926	91	438,293	17	78,507	15	67,538	—	—	4	18,188	148	701,452
5000— 6000	26	141,562	257	1,421,285	37	197,269	13	68,659	—	—	—	—	333	1,828,775
6000— 8000	25	169,700	180	1,191,707	175	1,218,607	6	40,059	—	—	—	—	386	2,620,073
8000—10000	20	176,165	8	70,895	83	733,274	7	60,662	—	—	—	—	118	1,040,996
10000—15000	21	248,556	—	—	27	306,394	—	—	—	—	1	12,395	49	567,345
15000—20000	7	124,544	—	—	—	—	—	—	—	—	—	—	7	124,544
20000—25000	8	177,042	—	—	—	—	—	—	—	—	—	—	8	177,042
25000— over	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Totals	167	1,245,502	719	3,653,150	352	2,573,126	54	275,861	21	47,864	7	36,079	1320	7,831,582

Permission has been received from the U. S. Maritime Commission to transfer the following vessels to foreign registry.
1 Passenger vessel — 3,289 tons.
19 Cargo vessels — 109,300 tons.
2 Tankers — 9,660 tons.

Table I

A COMPARATIVE STATEMENT OF "PRE-WAR" AND CURRENT SCHEDULED SAILINGS (ROUND VOYAGE) OF INTERCOASTAL LINES

LINE	AUGUST 1939 (Pre-war)	MARCH 1940	Slgs Per Year	APRIL 1940	Slgs Per Year
"A" (No. Atlantic)	Twice Weekly	Twice Weekly	104	Every 5 Days	73
(So. Atlantic)	Every 11 Days	Every 11 Days	33.2	Every 14 Days	26.1
"B" (W/bound Only)	Every 14 Days	Every 14 Days	26.1	Every 14 Days	26.1
"C"	Every 14 Days	Every 14 Days	26.1	Every 14 Days	26.1
"D" (W/bound Only)	Weekly	Weekly	52	Weekly	52
"E" (No. Atlantic)	Weekly	Weekly	52	Weekly	52
(Gulf)	Monthly	Monthly	12	Every 14 Days	26.1
"F" (No. Atlantic)	Weekly	Weekly	52	Weekly	52
(Gulf)	Twice Monthly	Twice Monthly	24	Every 14 Days	26.1
"G"	Every 10 Days	Every 10 Days	36.5	Twice Monthly	24
"H" (*Exception)	Weekly	*Twice Monthly	* 52	Twice Monthly	24
"I"	Weekly	Weekly	52	Monthly	12
"J"	Every 14 Days	Every 14 Days	26.1	Monthly	12
"K" (Gulf)	Every 14 Days	Every 14 Days	26.1	Discontinued	--
"L" (W/bound Only)	Every 14 Days	Every 14 Days	26.1	Every 14 Days	26.1
			600.2		457.6

Net Reduction (23.7%) 142.6 Sailings per year, or 11.9 Sailings per month.

NOTE: Calculations as to available intercoastal cargo space should include:-

1. # The net loss indicates 11.9 vessels per month as against which 12 coastwise vessels have been diverted to the intercoastal trade (Eastbound in March Westbound in April). These not included in the above tabulation.
2. Vessels bunched and off-schedule and not yet re-positioned due to San Francisco Bay clerks strike which ended January 5, 1940.
3. Approximately 75% full is usual average of all vessels, all lines. A 25% reduction of sailings should just only equalize space and cargo.
4. Northwest eastbound lumber volume is said to be abnormally heavy at present.
5. Westbound cargo is dull and tends toward dangerously light.

MERCANTILE FLEET OF THE UNITED STATES
IRON AND STEEL SELF-PROPELLED VESSELS OF 2,000 GROSS TONS AND OVER
AS OF APRIL 1st, 1940

(Excluding Great Lakes and Philippine Islands)

Arranged according to tonnage groups, types of motive power, and number and percentage of total classed by the American Bureau of Shipping

Tonnage Group	No. of Vessels	Gross Tonnage	Type of Machinery				
			Reciprocating	Turbine	Turbo-Electric	Diesel	Diesel Elec.
2000 to 3000	159	392,219	144	4	1	4	6
3000 to 4000	112	379,136	74	36	0	2	0
4000 to 5000	148	701,452	92	50	1	2	3
5000 to 6000	333	1,828,775	170	149	0	14	0
6000 to 8000	386	2,620,073	235	119	7	24	1
8000 to 10000	118	1,040,996	53	41	1	23	0
10000 to 15000	49	567,345	17	22	4	6	0
15000 to 20000	7	124,544	3	4	0	0	0
20000 to 25000	8	177,042	2	2	4	0	0
25000 and over	0	0	0	0	0	0	0
TOTALS	1320 vessels	7,831,582 tons	790	427	18	75	10

Total Number of Vessels	1320
" " " " classed by American Bureau of Shipping	996
Percentage classed by American Bureau of Shipping	75.4%

Table II

need more or less reconditioning and alteration to suit special requirements. Time will be a very essential element in this work. The shipbuilding and repair plants of the Atlantic Coast are at the present time comparatively much more congested with work than those of the Pacific Coast.

For this reason, a large part of this reconditioning work should be brought out to the yards of Washington, Oregon and California.

If the Maritime Commission runs true to form, the sale or charter of old tonnage on advantageous terms will be made contingent on a new building program. This will ultimately mean a large demand for new tonnage.

Leaders in such demand are the Matson Navigation Company, who have ordered four C-3 type Commission cargo carriers, modified to suit their special requirements on the Honolulu-New York run.

All of this is inserted here to show:

First, that even the present rate of construction on the ten-year Maritime Commission program will not finish that program on time.

Second, that the Atlantic Coast yards are fast filling up with contracts that will keep all of their facilities busy for several years ahead.

Third, that the demand for new tonnage is increasing at an accelerating rate.

Fourth, that because of these factors Pacific Coast shipyards are facing a very attractive future.

Errata

Some erroneous statements appeared in the April issue, for which we humbly apologize, and one or two omissions occurred, for which we are sorry.

On page 50, the two main feed pumps of the Explorer should appear as **Warren** centrifugals driven by Terry steam turbines.

On page 28, the smoke indicators mentioned as part of the fire room equipment should have been designated as **Diamond Smoke Indicators,** and it should have been stated that the boilers were equipped with **Diamond Soot Blowers.**

On page 25, under the subhead "Layout of Ship," the description of chain should have read, "are carried 240 fathoms of 1½-inch diameter **Naco Cast Steel Stud Link Chain,** supplied by the National Malleable and Steel Castings Company."

In the table on "Principal Characteristics" on page 37, "Total capacity, 42-gallon barrels, 12,900 bbls." should be "129,000 bbls."

The omission of a cipher means a lot even in these hectic days of pump priming and debt hiking.

STEEL VESSELS OF THE UNITED STATES OF 2,000 GROSS TONS AND OVER, STEAM OR DIESEL PROPELLED, WITH TYPE OF FUEL AND BOILERS

Arranged according to Type, viz., Passenger, Cargo, Tanker, Bulk Carrier, Ferry and Miscellaneous

(Excluding Great Lakes, Philippine Islands and Government Vessels)

(As of April 1st, 1940)

Type	Fuel		Boilers		Diesel	Steam	Type Vessel Total
	Coal	Oil	Scotch	Watertube			
Passenger	16	151	90	73	4	163	167
Cargo	31	688	484	212	23	696	719
Tanker	0	352	242	72	38	314	352
Bulk Carrier	34	20	52	2	0	54	54
Ferry	1	20	4	11	6	15	21
Misc., i.e., (Whalers, Fish Reduction Plants and Cable Ships)	1	6	7	0	0	7	7
TOTALS	83	1237	879	370	71	1248	1320

Table III

Dynamo flat, showing two G. E. generating sets and the main switchboard.

Hail To the Grace

S. S. Stag Hound, First Commission C-2 Pacific Coast,

By purchase or charter from U. S. Maritime Commission, the Grace Line has acquired three C-2 type fast steamers for its cargo service between Pacific Coast ports and the West Coast of South America, replacing the five older and slower steamers that have been maintaining that service.

S.S. Stag Hound, the first of these new ships to arrive on the Pacific Coast, steamed into San Francisco Bay during the night of Tuesday, April 9, and proceeded to the Howard Terminal, Oakland to unload her cargo. She was the first of the U. S. Maritime Commission cargo vessels to arrive on the Pacific Coast, and created a great deal of interest among the shipping fraternity.

Stag Hound was built and engined by the Newport News Shipbuilding and Dry Dock Company.

The other two ships will follow at four-week intervals. They are: the Red Jacket and the Flying Cloud, which: have duplicate hulls to Stag Hound; were built by the Federal Shipbuilding and Dry Dock Company; and are supplied with similar machinery and equipment supplied by various manufacturers. This class of steamers holds the world fuel economy record.

Stag Hound, like her two running mates, was named for a famous American sailing ship. The original Stag Hound was built by the great Donald McKay at East Boston, and launched December 7, 1850.

Principal Characteristics
S.S. Stag Hound

Length O. A.	459′ 3″
Length B. P.	435′ 0″
Beam molded	63′ 0″
Depth molded S. D.	40′ 6″
Draft loaded	25′ 10⅜″
Gross tonnage	7,169.45
Net tonnage	4,328
Cargo deadweight	9,493 tons
Bale capacity	457,900 c.f.
Refrigerated capacity	32,288 c.f.
Shaft horsepower	6,000
Sea speed, loaded	15½ knots

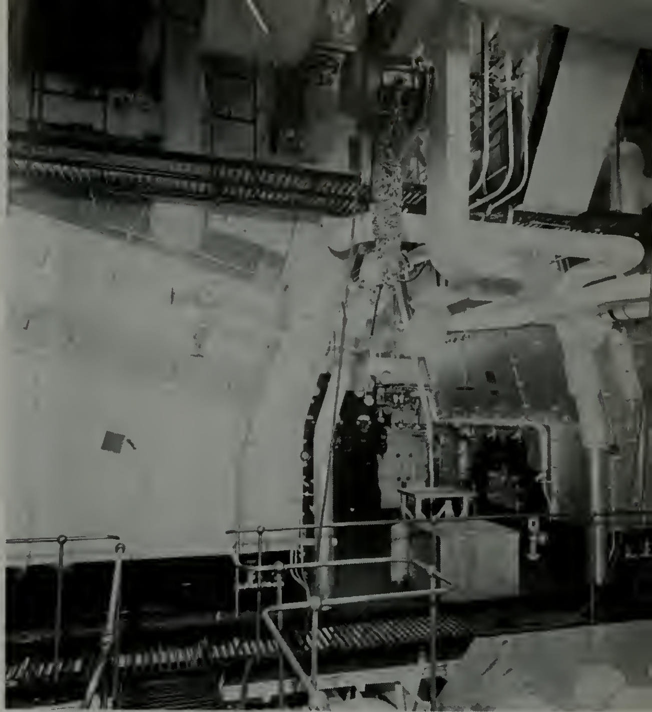
She has a cruiser stern and a finely-raked bow with good sheer, giving her profile that rakish liveliness which is so attractive to the ship lover. Her single deck house erection is somewhat aft of amidships and over the machinery space. There are two complete steel decks, extending from the bow to the stern, and a third steel deck below the second deck, extending from the stern to the forward engine room bulkhead, and from the after engine room bulkhead to the after end of hold No. 4.

Cargo holds Nos. 1, 2 and 3 are located forward of the engine room, and Nos. 4 and 5 are aft of this

S.S. Stag Hound, ready for her trials, appears fit for strenuous service on ocean trade lanes. The pictures illustrating this article were made available through the courtesy of the Newport News Shipbuilding and Dry Dock Company.

Cargo Liners!

of the Maritime Type to Reach the Arrives at San Francisco Bay



Close-up of the two B. and W. boilers.

space. Seven watertight bulkheads divide the hull into eight watertight compartments—the five cargo holds, the engine room space, the fore peak tank and the after peak tank.

For carrying dry or oil cargoes, or for liquid ballast, deep tanks are provided in holds Nos. 2 and 4. The total capacity of these tanks is 3,462 tons of sea water.

Excellent provision is made for fast and efficient handling of cargo. Ten king posts support 14 cargo booms, each of 5 tons capacity and 55 feet in length. At the forward end of No. 3 hatch a heavy lift boom is fitted. This boom is 60 feet long and is rigged to lift 30 tons. Fourteen American Hoist and Derrick Company cargo winches of the geared electric drive type serve the cargo booms. Each winch is driven by a General Electric Company 45-H.P. motor, and is capable of hoisting 6,720 lbs. at the rate of 220 feet per minute.

In the deck house, modern accommodations are provided for eight officers and a crew of forty-two. These feature the best in plumbing fixtures, supplied by the Standard Sanitary Corp. through the Noland Company, Inc.; fireproof furniture and joiner work; ample bath and sanitary equipment; not more than two persons in any one room; adequate ventilation, heating and lighting; electrical, stainless steel trimmed galley and pantries, and commodious recreation and dining rooms for both crew and officers.

Propulsion Machinery

Stag Hound is a single-screw steamer. Her propeller is a solid bronze wheel of four blades designed to drive the hull at 15½ knots sea speed fully loaded when turning at 92 r.p.m. This wheel is 19 feet in diameter, weighs 15½ tons, has a surface area of 132.69 sq. ft., and a variable pitch, which at 0.7 radius is 19.875 feet.

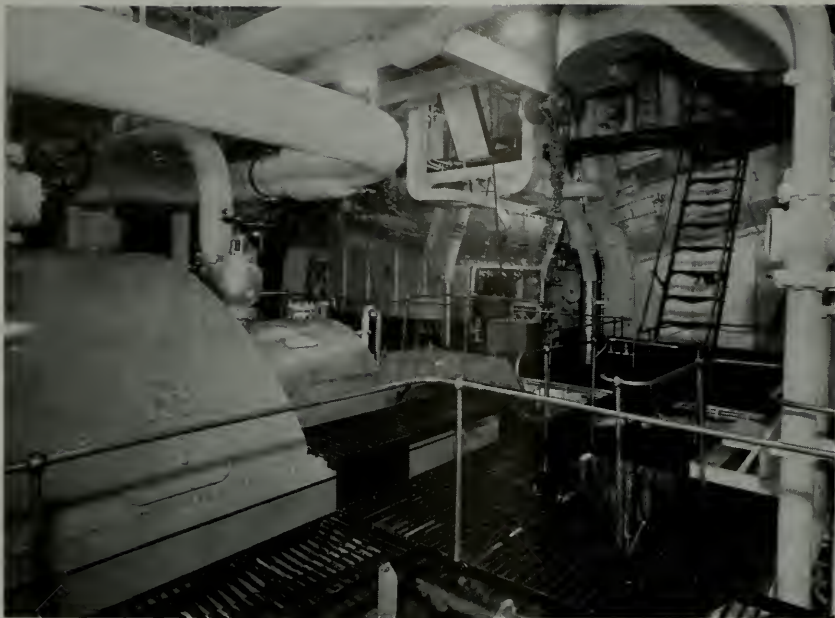
The propeller shaft is driven by a Newport News Shipbuilding and Dry Dock Co. cross compound turbine through a Westinghouse double reduction gear set.

Steam for the turbine is generated at 450 p.s.i. pressure and 770° F. temperature by two Babcock and Wilcox single-pass, sectional-header water-tube boilers with air preheaters and water-cooled furnace walls. Steam leaving the turbine exhausts directly into the main condenser, built by the C. H. Wheeler Manufacturing Company, which is served by Warren circulating and condensate pumps and by Wheeler air ejectors, and is fitted with Chase Brass & Copper Co. tubes. Condensate is pumped to the Cochrane deaerating feed water heater, which removes entrained air and acts as a closed hotwell. From the deaerating heater, the feed is pumped by electric motor drive Buffalo feed pumps through the second stage heater to the boilers.

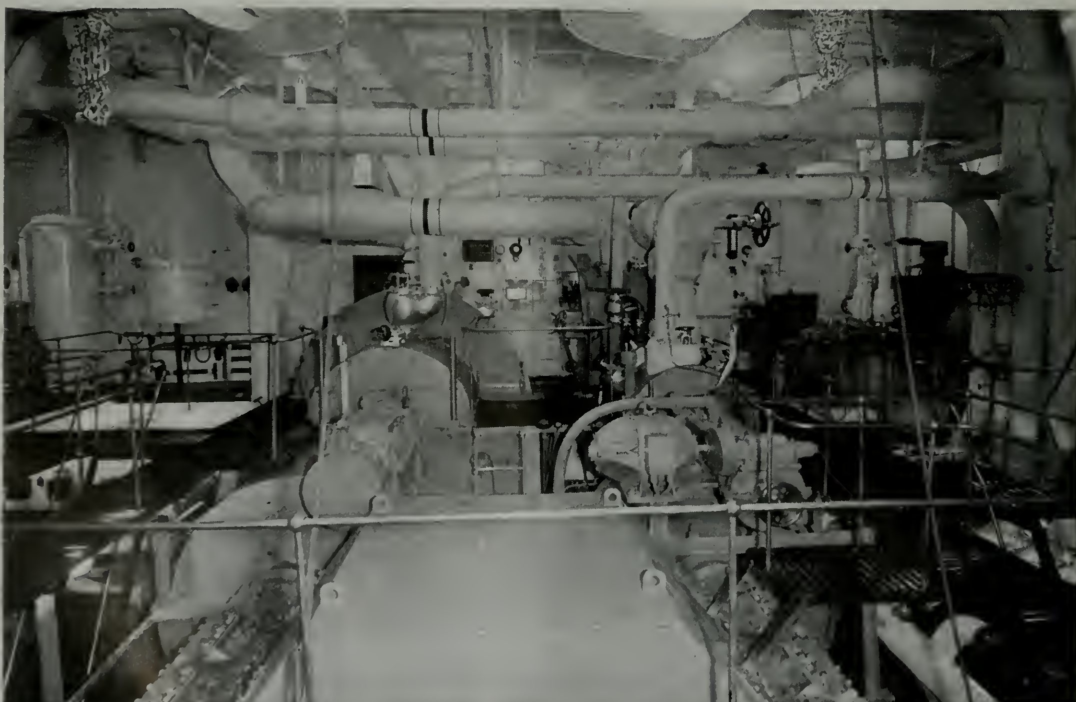
The main turbines are of the impulse reaction type in two casings, high and low pressure. Each rotor is direct connected to a pinion meshing with one of the intermediate speed gears of the gear set, which in turn drives a pinion meshing with the low-speed gear directly connected to the propeller shaft.

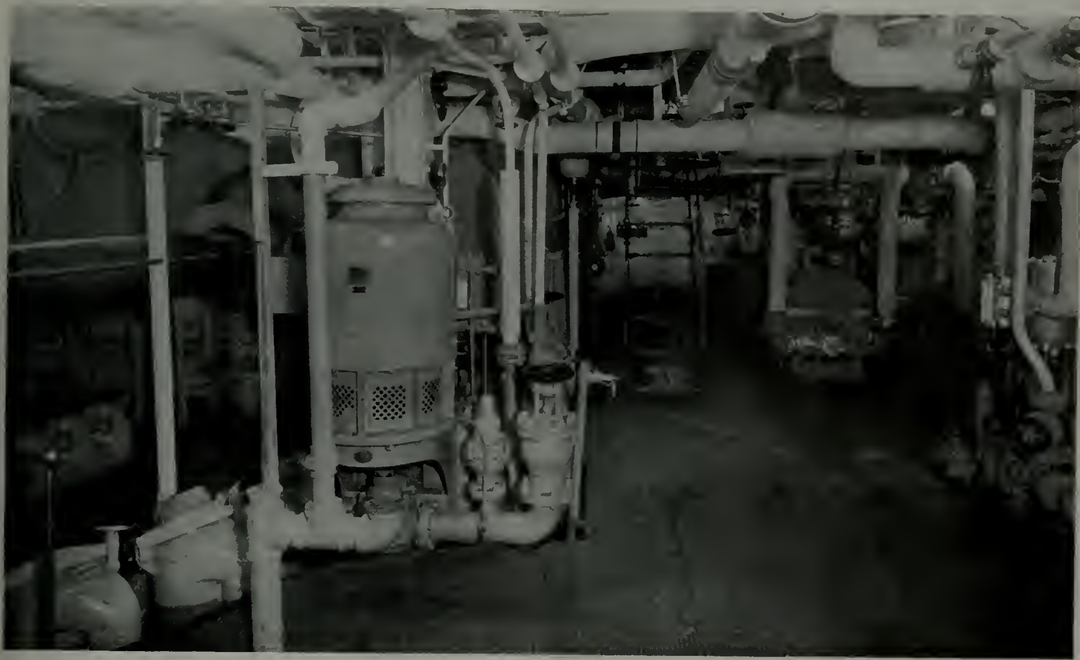
Both turbine bearings and gears are lubricated by a gravity feed system draining into a sump at the bottom of the gear case. Piping is so arranged that this lubricating oil can be purified either continuously or by the batch system through a Sharples Centrifuge. The lubricating oil, service and transfer pumps are by the Quimby Pump Co. Lubricating oil in service is cooled by a Griscom Russell cooler.

An astern element is built into the low-pressure turbine. This turbine is rated 6,000 shaft horsepower, and specifications call for ability to generate 6,600 S.H.P. continuously, and 7,500 S.H.P. for two hours, when supplied with steam at throttle pressure of 440 p.s.i. and 740° F. temperature, and exhausting into a

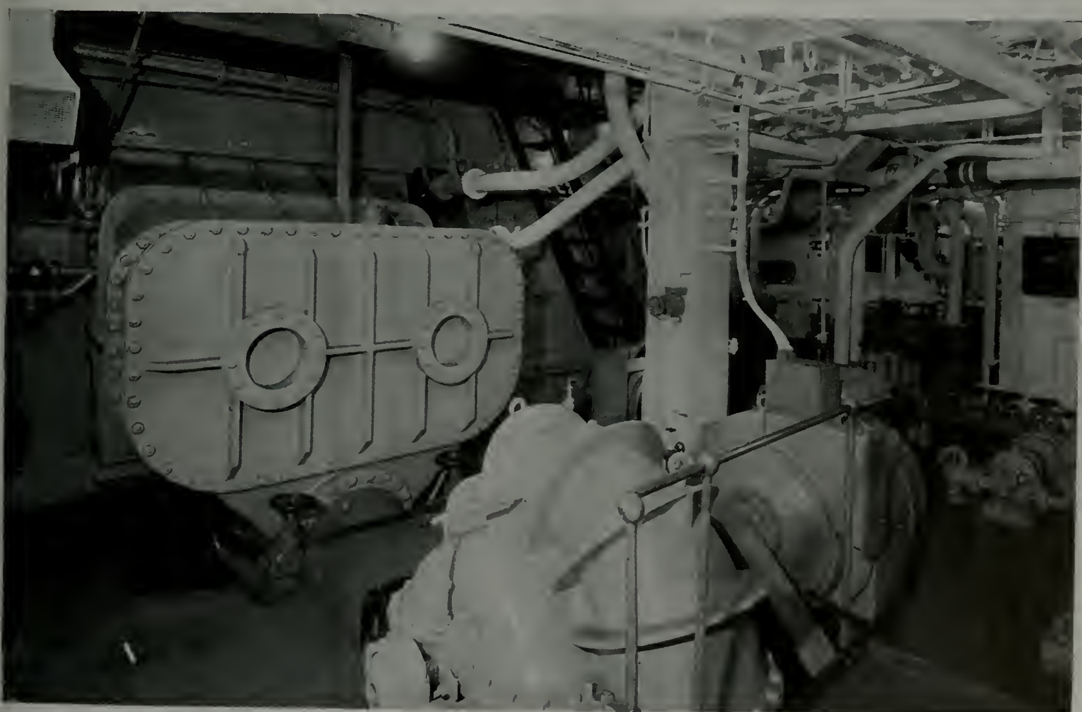


The upper grating in Stag Hound's engine room. At left: Looking aft over the low-pressure turbine to the boilers. Below: Looking forward across the gear casing and between the turbines to the control stand.





The floor of Stag Hound's engine room. Above: The reduction gear case and some pumps.
Below: The condenser and circulating pump.



vacuum maintained at $28\frac{1}{2}$ inches. The builder guarantees a specific fuel economy of 0.62 lbs. per shaft horsepower hour.

The gear set is the modern type Westinghouse with welded steel casing and built up steel wheels. It incorporates a Kingsbury thrust bearing for the propeller shaft.

Induced draft is used on the boilers, which have a double shell with the combustion air from the preheaters coming down in the space between the casings and picking up heat that may leak through the inner casing. Each boiler is fitted with four Babcock and Wilcox Decagon wide-range mechanical atomizing oil burners. Diamond soot blowers maintain a clean fire surface in the tube banks, and Apexior lining in the steel tubes and headers insures a clean water surface. Diamond smoke indicators are installed.

These boilers are constantly under the supervision of a Bailey automatic combustion and feed water control system, which eliminates all irregularities of firing and maintains the fuel, air and feed water supply at just the right amounts and proportions to produce the required steam with the best economy. The majority of the steam traps are from the Wright-Curtis Co.

An interesting feature of the installation is the arrangement of the machinery space, which sets the boilers just aft of and slightly above the turbines, and all in the same compartment. The control stand for the engineer is on the second grating level, and standing there, the engineer has a full view aft over the turbine and through the fore and aft firing space between the two boilers directly at the gage board of the Bailey control system. In this engine room, the engineer on watch can see what is going on in his fireroom just as well as he can see what is going on around his turbines.

For lighting and for auxiliary power, two General Electric 250-K.W. steam turbine drive generating sets are installed in the dynamo flat in the engine room. Energy from these sets is distributed through a switchboard built by the Newport News Shipbuilding and Dry Dock Co. Practically all of the auxiliary motor drives are by General Electric motors serviced by General Electric controls.

For emergency light and power, a 5-K.W. Star generator is installed, driven by a 10-H.P. Stover diesel engine. This set floats on an Exide storage battery, and is so connected that on any failure of the auxiliary generating sets it automatically starts and picks up the connected circuits necessary to take care of emergency lights and power.

American Engineering Co. supplied: the electric-hydraulic steering engine and telemotor, the anchor windlass, and the mooring capstans. She is equipped with Baldt anchors and with Naco cast steel stud link anchor chain.

Navigating and Safety Equipment

Stag Hound is thoroughly equipped with modern navigating equipment, including: Sperry master gyro compass with repeaters at all navigating stations; Sperry gyro pilot for automatic steering; magnetic compass and binnacle supplied by Negus; Westinghouse searchlights; latest type Mackay marine radio transmitting and receiving equipment; Henschel intercommunicating systems; Bailey draft gages; Doran whistle controls; and Kearfott pilot house and bridge enclosure windows.

Welin lifeboats hung on Welin davits are installed on the boat deck. The cargo spaces are all covered by a Richaudio smoke detection system with Lux CO_2 smothering connections, both supplied by Walter Kidde and Co.

All cargo holds are mechanically ventilated. The 32,000 cubic feet of refrigerated cargo space is served by Carrier refrigerating machinery.

A Mystery of the South Pacific

During the second half of 1938 the news was received that the German training ship Admiral Karpfanger had been lost during the voyage from South Australia to the English Channel. We have the following interesting story from Captain Franz Schulze, who, since the beginning of 1935, has represented the Hamburg American Line on the North Pacific Coast, with headquarters in San Francisco.

In July, 1937, the Finnish fourmast barque L'Avenir was sold to the Hamburg American Line to be used as a training ship, and was renamed Admiral Karpfanger. After the ship had been thoroughly ovehauled, she left Hamburg in ballast on September 20 for the run down to Australia for a cargo of grain. There were sixty in the crew, including about 40 cadets.

She rounded the North of Scotland and arrived at Port Germain, South Australia, on January 5, 1938, after an uneventful voyage. After loading a cargo of 3,500 tons of grain, she left this port on February 8, destined for the English Channel via Cape Horn. She was not favored by strong winds, so on March 1 was only 200 miles south of New Zealand, where she radioed her position as 51° South and 171° East. On March 11 she received a radio from Norddeich, Germany, telling the second officer that he was the father of a boy. On March 12 the ship radioed to Norddeich confirming the receipt of this telegram. The ship had previous orders to radio her position on certain days; the next day for such a report was the 16th of March, but such a radio was never received. So after the 12th of March nothing more was ever heard of the Admiral Karpfanger.

The Hamburg American Line made a prolonged search for the ship, even sending one of their Australian steamers around Cape Horn to look for her. Also, information was gathered from steamers of other nationalities, which, during March, April and May, were in this part of the globe. The nearest vessel was the English motorship Durham. About eight days later she passed the track where the Admiral Karpfanger should have been. The captain of this steamer reported that he saw on the 20th and 25th of March, about $55\frac{1}{2}$° South, not less than eight icebergs. There were six large and two medium-sized icebergs, the largest about 1 mile long and 500 feet high.

(Page 47, please)

Security and the Export Trade

By William K. Jackson

Vice President, United Fruit Company

Security today seems to be man's chief aim. It is the warp and woof of every international fabric, Asiatic or European. It dominates the waking consciousness of our socially-minded political aspirants. It is the promised land, the Valhalla, into which we are all to be led. We are helped to scale the mountain top, and told to take and possess that great, vast, rich, unending security which lies spread out before us. And what nature of thing is this security? To the ambitious leader of a great people of Central Europe it means "Lebensraum"—a place to live and stretch his Nordic legs, unimpeded by other ancient civilizations, where he may dominate the religious thought of his people and dictate the God to whom their supplication may arise. To the great colossal bear of Eurasia it means the gobbling up and subjugation of those people whose mere proximity in itself detracts in some way from that indispensable security. For those having attained the age of sixty-five, however encumbered they may be with worldly goods, or for those to whom some malefactor of wealth has not offered the kind of a job they want, security seems to be the inherent right to set the tax gatherers upon the producers of the community to fill a storehouse out of which this newly-created class of privilege may live in comfort without care or toil. And so on. But do you notice that in all these various forms of security, someone else always seems to be in the way, or someone else must create for me that security which is my God-given right? It is only through acquiring the ownership of what the other fellow has that this kind of security is attained.

W. K. Jackson

There is another kind of security—the security to live and work and enjoy your own without threat or menace. That is the type of security for which the Finns fought so heroically, and for which surviving democratic governments must be eternally vigilant. In a less heroic sense there is security for the Queen Elizabeth and the Normandie when moored alongside our docks, or for foreign gold stored in our bank vaults.

Foreign Trade Vital

But let us get down to exporters. We are exporters. We are interested in taking an inventory of what we have got and then devising a system of security for this world of ours. We are pretty important fellows after all. Sometime in an excessive glow of nationalism and domestic self-sufficiency, we disdainfully refer to our foreign trade as about only 10 per cent of our total trade, and therefore relatively unimportant. The members of this club are not given to such careless thinking. You know that our foreign trade from year to year exceeds in gross value the total aggregate of the net profits of all of our manufacturing corporations. This was even true in the so-called super business year of 1929. Our foreign trade is a bigger business than our automobile industry or the business of the railroads and trucks. These simple illustrations should effectively dispel any feeling of indifference to foreign trade. Our export trade in 1939 amounted to about \$3,177,000,000, and our import trade to about \$2,318,000,000.

But during the month of January of this year our exports increased about 73 per cent above January of last year, while at the same time our imports increased only about 35 per cent. Our January exports exceeded our imports by \$123,000,000. This is the same trend that started with the outbreak of the war. Undoubtedly this same disparity between exports and imports has continued since the first of the year. Here is food for further thought. This presents a badly unbalanced situation, which obviously cannot continue indefinitely. There is insecurity in the magnitude of the disparity. Certainly this increase in our export business has had a very stimulating effect upon our domestic economy. It has filled in to some extent the depressions that would have otherwise existed in our industrial activity. Is this a sort of industrial shot in the arm, or is it a dependable and normal growth which ensures security to the labor and facilities engaged in producing these new goods? Presumably we are getting gold for our surplus of exports, or so-called balance of trade. But how long can we sell so much more than we are buying?

Trade, either domestic or foreign, involves a meeting of the minds of two persons, where each receives something and each parts with something. There is no such thing as a

one-way trade. The fellow who wants to buy something you have got can pay you in one of three ways—either in services, goods, or by token, such as money. When we enter the field of foreign trade there are still only the three ways in which the foreigner can pay us for our goods. We cannot stand upon our secluded and inaccessible shores, cast our goods upon the waters and expect to have the sad sea waves wash up the kind of dollars we want in return for our goods. The performance of services by the foreigner to the American seller is well-nigh impossible. The passing by the foreigner to the American of tokens of some kind, or money, is likewise becoming almost impossible.

We Have Too Much Gold

We already have about 60 per cent of the world's gold. Free exchange has almost disappeared from the face of the earth. Even the American stocks and bonds owned by foreigners have largely been sequestered by their governments to be utilized in furthering their war economy. They are not available for use in payment for ordinary peace-time goods.

But since we have not yet got all of their gold, perhaps some will say —why worry?—at least as long as it is cash and carry and we are getting their gold—almost every steamer brings us large masses of inert yellow metal. And after we have more or less all of their gold, then what? Add it to the some $5,500,000,000 we have already buried out in the peaceful hills of the blue grass regions of Kentucky? There it is just about as productive, and no more so, than the talent which the man in the Bible buried. It is not producing goods. It does not give jobs to the unemployed. It does not cause or bring about the exchange of goods between the people of this country or between the people of this country and those of other countries.

The food put into the body is worthless unless it is assimilated—unless it is put to work and is turned into bodily action or is converted into blood and bone and sinew. This vast hoard of deposited gold is about as healthy and as worthwhile as the calcareous deposits which unwontedly form in our internal organs. It is somewhat like the arthritic calcification of the joints which slows up all movement and action.

How can this hoarded store of gold ever serve any useful purpose? With it we can buy goods and services, but we do not need it for our internal system of monetary exchange. If ever peace is to return to the world, then it will be needed by other countries for stabilizing exchange so that normal business processes may go on. But how are they going to get it? Are we to give it to them? Are we to lend it to them as some have suggested; but even if we do, they must repay the loan, and how? Again and again we are confronted with the inescapable conclusion. The only method left is that of buying the goods of the foreigner or taking them in exchange for our goods. Just as the Good Book says that there will be hewers of wood and drawers of water, so in the foreign trade field there must be buyers of goods if there are to be sellers of goods. There can be no creation or maintenance of trade and prosperity in the foreign field unless we buy substantially as much as we sell. Any difficulties which beset either of these acts in a free interchange of sales must be overcome.

We Must Buy to Sell

It is not enough to create markets for what we grow and manufacture. Salesmanship does not end when we have overcome customer or buying resistance of the foreigner. We must be susceptible to the wiles of the foreign salesman, or else we have a willing buyer but with no means with which to buy. We must be ready to buy that of which he has a surplus. Preferably, it should be his raw materials which we lack and need, so that we, with our capital and vast manufacturing facilities may produce the finished manufactured products which we may use and enjoy. Perhaps we may be able to enhance our own comfort and standard of living by increasing our consumption of these products.

In any event, to sell we must buy.

A two-way turnover in foreign trade is the essential of a prosperous foreign trade. The rapidity of the turnover determines the degree of the prosperity, and by turnover I mean the turnover of the foreigner's goods as well as the turnover of our own goods. The turnover cannot be rapid unless we buy about as much as we sell. They are one and inseparable.

No dexterous politician with the scapula of economic nationalism can bisect the Siamese twins of buying and selling in foreign trade so that both or either can live and prosper. Like our circulatory system, the arteries that carry the blood from the heart to the extremities of the body are the selling conduits in foreign trade. The veins which bring the blood back to the heart are the buying canals in foreign trade. There can be no life in foreign trade except that there be an equal and constant flow in both the arteries and veins of the two-way selling and buying process. There can be no continuous flow of blood from the heart through the arteries unless the veins bring it back again. Foreign trade is a two-way process, and selling is no more important than buying.

Restrictive Legislation

Our legislators are wont to be sellers of our goods—supernationalism in the field of salesmanship. They often think that they can choke off the return circulatory system of buying and keep up the outward flow of our sales. In their overzealous earnestness to find a market for our system of mass production, in their eager and earnest desire to maintain a system of high wages and short hours, there are those exporters who feel it to be the solemn duty of our government to assist in finding buyers of our goods.

They forget that the process of life is one of inhalation and exhalation, and so is trade. Any producers or manufacturers or sellers in export trade who insist upon putting obstructions or barriers in the way of the inhalationary process of importing goods do their country a great disservice because they stifle the trade which they so want to energize.

Stifling legislation throughout history has been harmful to trade, and hence to our own welfare and happiness—whether it was the embargo and non-intercourse act of a century ago, or whether it is the ill-conceived Neutrality Act of today.

Restrictive legislation creates

nothing. It dries up the wells of enterprise and destroys individual initiative, whether it be a law which restricts an American owner in the free operation of his ship or his freedom to sell or dispose of his ship, or whether it be a totalitarian law which overthrows private ownership. It requires little skill or intelligence to wantonly destroy. Statesmanship in public affairs or in business is constructive when it creates trade and removes the barriers and restrictions upon the free flow in both directions of trade and commerce.

No one, not even those overzealous candidates for the highest political office, steeped in slavish loyalty to the high tariff protective policy, dares suggest that foreign trade is not a vital and important factor in our domestic prosperity. They stress its importance, but some of them seem to hope by some process of legerdemain or wizardry they can be the "Houdini" that will find a way of making the other fellow buy your goods and pay for them without your having to buy anything from him.

A negative sort of security will arise if we are on guard to prevent that type of restrictive legislation which creates trade barriers and high tariff walls against those foreign goods which are not, generally speaking, competitive with ours, or whose admission would be more beneficial than harmful to our economy; also that type of legislation which bars our ships from the most important sea lanes of the world's commerce, and subjects our trade to a slavish dependence upon the transportation facilities of others. Sometimes the most far-reaching and appalling results come from most worthy gestures in efforts to serve the noble cause of peace. Europe's Munich and our Neutrality Law are alike in their conception, and alike in their heavy sacrifices without any reward.

Merchant Marine Needed

An affirmative measure of security may be attained if we insist upon having a reasonable amount of American tonnage in which to transport the goods we sell and the materials we buy so that we may not suffer the disastrous effects of the wholesale withdrawal of the foreign ships upon which we have too largely depended in our carrying trade. The absence of American tonnage places the exporter absolutely at the mercy of the foreign ship operator, both as to whether and what kind of service is available, and the rates charged. A merchant marine adequate to carry a goodly share of our overseas trade, privately owned and operated by Americans, is an indispensable part of any scheme of security for foreign trade. The building up of the American Merchant Marine should receive the solicitous encouragement and support of organizations such as the Export Managers' Club.

The disturbed economic and political conditions prevailing throughout the entire eastern half of the world accentuate the need for even closer ties between the peoples of the Western Hemisphere; closer ties of trade and cultural relations in every walk of life.

Build Up Western Hemisphere Trade

The countries to the south of us, and ourselves, are in the same economic orbit. We have the capacity and willingness to purchase many of the raw materials of their forests, farms and mines, which we need to add to the standard of living and comfort of our people. They can complement their own goods with the products of our fields and factories so that their people may have the benefit of what our workers produce. It is all so normal, logical and reasonable, without any element of political domination or commercial exploitation. It is in the daily marts of trade that friendship and understanding between good neighbors are made. Trade with us involves no imposition of unwonted political theories.

This Hemisphere presents an unusually attractive field for skillful and intelligent development of a new security for all its peoples. There is a large need in Latin America for goods which have heretofore been supplied by European nations, and it is most natural that they should look to us. They were able to buy from Europe because Europe bought their goods. Are we willing to take Europe's place as their customer, and buy their surplus coffee, grain or meats? If not, it is difficult to see how they can buy and pay for more goods than they have been buying from us already, unless we are willing to bestir ourselves and make a market for more of their products. Where our normal trade or sources of supply have dried up or diminished elsewhere, we should endeavor to replace it with our neighbors, and buy more of our goods from them. We should also use some of our surplus capital and brains to make direct investments in establishing new enterprises in Latin America, which have not previously existed there—and which produce new products or raw materials for which a market already exists in foreign trade, or for which a market is created. Such direct investments are the highest form of creative investment. They furnish a desirable outlet for our capital and technical skill, they place large amounts of money in circulation, put people to work and increase their purchasing power, so that they may enjoy a higher standard of living and purchase some of the manufactured goods and agricultural products for which we so earnestly desire a market. It tends to bring about a free and normal flow of desirable international trade, and keeps open that two-way road without which there can be no foreign trade. All natural conditions exist in this Hemisphere for the development of a greater New World self-sufficiency in raw materials and manufactured products, so that our peace and prosperity should not be cut athwart by the national jealousies and conflicting international ambitions of the Old World powers.

The promotion of trade is an ancient and honorable pursuit.

We do not want security at the price of any man's liberty. We do not want security at the price of some other man's insecurity or sacrifice.

We want that security that comes from confidence and trust, which can only come when there has been a fair bargain; where each is satisfied to have given up what he has parted with, and each is happy in the possession of what he has received.

Address before Export Managers' Club, New York, March 26, 1940.

The Famous

American Clipper Stag Hound

Donald McKay's First Extreme Clipper Model

The clipper ship Stag Hound, designed and built by Donald McKay at his East Boston yard, was launched on December 7, 1850. She was the first of the very sharp, or extreme, clippers, and the largest and longest merchant sailing vessel yet built in America. Like her modern C-2 namesake, she was the first of her kind to visit the Pacific Coast.

Donald McKay was given the order to build this vessel by George B. Upton and Sampson and Tappan of Boston, who agreed to let the master builder design and build the vessel along original lines calculated to insure a speedy vessel of large carrying capacity and with dry decks.

The result was a hull with long, sharp clearance lines and entrance, and very tall, heavily-sparred masts. Her appearance was so different from the usual bluff-bowed sailing ship that recognized experts freely expressed great doubts of her stability and seaworthiness. The maritime scribes of that day were therefore very keen on describing every feature in great detail, and consequently we know a great deal about this ship and her career.

Shipbuilders were evidently working for records in those days, since Stag Hound was launched practically complete in 100 working days from the laying of her keel. Her cost would be about $165,000. Her principal characteristics were:

Length, keel	207 feet
Length B. P.	215 feet
Length O. A.	226 feet
Rake of stem	6 feet
Rake of stern	2 feet
Beam	39.8 feet
Depth, hold	21 feet
Depth of keel	46 inches
Dead rise	40 inches
Sheer	30 inches
Tonnage O. M.	1,534
Tonnage B. M.	1,100

American clipper ship Stag Hound.

The overall length given in this table is that of the hull from knightheads to taffrail. For her complete overall length, including bowsprit, jiboom and flying jiboom, we must add 80 feet. The beam given is also for the bare hull. Her main yard set square gives her a potential beam of 86 feet and her main skysail pole was 188 feet above the water.

Under full canvas with every sail drawing, she must have been an imposing sight. Light winds drove her at 7 to 8 knots, and under strong winds she frequently logged 16 to 17 knots. On at least one day of her career she averaged 15 knots for the 24 hours.

The marine scribes of those days filled the Boston daily press with admiring articles describing her grace and beauty. Here are some samples:

"This magnificent ship has been the wonder of all who have seen her. Not only is she the largest of her class of boat, but her model may be said to be the original of a new idea in naval architecture.

"She is uncommonly sharp forward, yet her bow bears no resemblance to that of a steamer; it seems to have grown naturally from the fullness of her model to a point, but so beautifully proportioned that the eye lingers on it with delight.

"A carved and gilded stag hound, represented panting as in the chase, and carved work around the hawse holes and on the ends of her catheads, comprise her ornamental work about the bow. She has neither head boards nor trail boards, and may be said to be naked forward; yet this very nakedness, like that of a sculptured Venus, true to nature, constitutes the crowning element of her symmetry.

"She sits upon the water as if ready for a spring ahead. Her great length, the smoothness of her outline, and the buoyancy of her sheer, combined with the regularity of her planking and the neatness of her moldings, impress upon the eye a form as perfect as if it had been cast in a mold.

"The eye, directed along her rail from the quarter to the stem, would perceive that her outline at the extreme is as perfect as the spring of a steel bow."

The reproduction of her lines, mid-

ship section, bow and stern profiles, shown herewith, give ample proof that these scribes were not over-emphasizing the beauty of this hull.

Aloft she was equally striking. Her three masts were all raked alike at 1¼ inch to the foot. Her mast centers were set: fore, 50 feet aft of stem; main, 67 feet aft of fore; mizzen, 42 feet aft of main and 42 forward of stern post.

The steeve of her bowsprit and jibooms was 4½ inches to the foot.

Her structural timbers were of rock maple, oak, hatmatack and hard pine, fastened with copper and iron bolts. She was well-seasoned with salt, and had ventilators in decks and along the line of plank sheer fore and aft.

Her bulwarks, including the monkey rail, were 6 feet 6 inches high. This gave the hull a flush line from stem to stern, since the forecastle, forward cabin top and poop deck were all set at the level of the top of bulwarks.

Accommodations

Stag Hound's arrangement of accommodations for crew and petty officers followed very modern lines. They were not in the forecastle except that in that space were fitted for crew use the then very new and ultra-sanitary water flushing toilets. The forward deck house just abaft the foremast was 42 feet long by 24 feet wide, and in this were fitted spacious and comfortable quarters for the crew and petty officers. Here, too, were the galley and the store rooms.

Staterooms for the captain, three mates and a steward were fitted in the forward end of the accommodations under the poop deck. This deck was 44 feet long. The main deck under was dropped 3 feet so that with the poop deck at main rail level, the space below had 6 feet 8 inches head room.

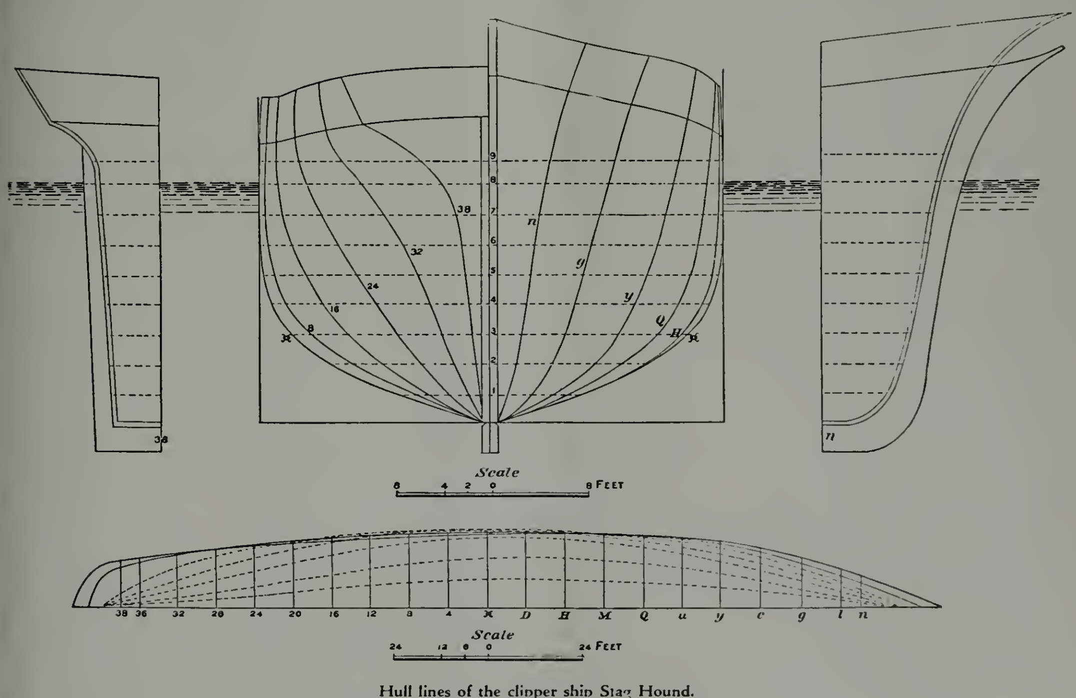
The staterooms mentioned above were grouped around a cabin 12 feet by 18 feet, which served as a lounge or dining room space.

Aft of this was an after cabin for passengers. As described in the Boston press, "Its after division is fitted into a spacious stateroom with 2 berths." Forward of this, on each side of the cabin, there were in the order named: "a water closet; a stateroom; an 8-foot-wide recess, and two staterooms. The sides and ends of the cabins were finished in mahogany Gothic paneling, with enameled pilasters and cornices and gilded moldings." A large skylight over each cabin furnished illumination and ventilation. Each stateroom had at least one deck light and one side light.

Propulsion Machinery

To take full advantage of wind power, Stag Hound could spread 9,500 square yards of the best cotton duck in sails, which were all under full direction of the navigator through a properly-trained crew, and rigging and cordage designed especially for easy and sure control of yards and of sails.

We have no empirical formulas by which we can approximate the actual horsepower delivered to this hull by the towering mass of white wings that adorned her spars. However, we know that to drive such a hull through the water at a speed of 15 knots, a modern propeller would require approximately 3,000 shaft horsepower. Occasionally logging 16 or 17 knots, Stag Hound's freely-



Hull lines of the clipper ship Stag Hound.
(From Hall's "Shipbuilding Industry in the United States.")

impressed wind power would approximate up to 4,000 horses.

The auxiliary machinery for Stag Hound's operation was very simple compared to that of a modern cargo carrier. "She had: patent copper pumps (evidently bilge pumps—Ed.) which work with flywheel and winches; a patent windlass with ends which ungear (evidently with gypsey heads operating through clutches—Ed.); and two beautiful capstans made of mahogany and locust, inlaid with brass." She also had a new patent steering apparatus, "embracing the latest improvements" and mounted on the poop deck.

As already stated, her cost was approximately $165,000. She left New York on February 1, 1851, with Captain Josiah Richardson in command, and a crew of 36 A.B. seamen, 6 ordinary seamen and four boys. Her cargo rate to San Francisco was $1.00 per cubic foot, and her freight list at this rate exceeded $70,000. She lost some spars in a storm when 6 days out, and, notwithstanding, arrived at Valparaiso, Chile, in 66 days, the shortest passage (save one) up to that time. After 5 days in Valparaiso for repairs she cleared and arrived in San Francisco in 42 days, or 113 days total out of New York. After discharging cargo, she sailed for the Orient, arriving in Whampoa on September 26. After loading a cargo of tea for owner's account, she sailed on October 9 and arrived in New York on December 24, just 10 months and 23 days after her departure.

The tea was sold at auction, and after the accounts were all checked and bills paid, it was announced that this voyage had earned the entire cost of construction and operation and left a balance of some $80,000 net profit to be divided among the owners. No wonder the American merchant of those days was ready to invest in American flag shipping.

Deaerating Feed Water Heater

The introduction of higher pressures and temperatures in marine power plants has emphasized the benefits of pure feed water free from dissolved oxygen. During the past three years the demand for deaerating equipment has increased in proportion to the increase in steamship building.

The Cochrane Atomizing Type Feed Water Deaerating Heater is designed particularly for marine application, and within the past two years has attained wide recognition as an efficient aid to steam plant economy in practically all types of seagoing ships.

The list of installations includes:

- 28 units for U. S. destroyers
- 8 units for U. S. cruisers
- 8 units for U. S. battleships
- 8 units for U. S. airplane carriers
- 2 units for U. S. repair ship
- 15 units for C-1 cargo vessels
- 4 units for C-2 cargo vessels
- 7 units for C-3 cargo vessels
- 2 units for Texas Co. tankers
- 1 unit for steamer Conway
- 1 unit for Manitowoc carferry
- 1 unit for U. S. Engineers snagboat

The Cochrane Atomizing Deaerator, under normal rated conditions, will remove more than 99 per cent of the dissolved oxygen in the entering make-up supply. The residual dissolved oxygen content of the effluent from this equipment will normally be less than 0.005 c.c. per liter, and will probably be of the order of 0.001 c.c. per liter.

In fact, it is often apparent that the efficiency of the deaerating equipment surpasses the ability to detect oxygen of the very sensitive Winkler test.

Deaerating equipment is usually guaranteed to deliver water having a dissolved oxygen content not in excess of 0.03 c.c. per liter. The specifications of public utility corporations for some of their large power plants require and get deaerating equipment the effluent from which will show zero dissolved oxygen by the Winkler test.

1939 Vessel Safety Contest

Announcement from the Accident Prevention Bureau of the Waterfront Employers' Association of the Pacific Coast cites the following vessels as having won safety pennants under the rules of the 1939 Vessel Safety Contest:

Passenger Vessels

Class A: S. S. President Coolidge, American President Lines.

Class B: S. S. Alaska, S. S. Mt. McKinley, Alaska Steamship Co.

Class C: S. S. Pres. Van Buren, S. S. Pres. Monroe, American President Lines.

Freighters

S. S. Point Ancha, S. S. Point Arena, S. S. Point Estero, Swayne & Hoyt; S. S. Mary D, Alaska Steamship Company; S. S. C. R. McCormick, S. S. West Camargo, S. S. West Ivis, S. S. West Cactus, S. S. West Ira, McCormick Steamship Company; S. S. Manukai, S. S. Mapele, S. S. Ewa, S. S. Onomea, S. S. Manulani, S. S. Makiki, S. S. Hamakua, S. S. Waipio, S. S. Makaweli, S. S. Kailua, S. S. Mahimahi, S. S. Maunawili, S. S. Mauna Loa, S. S. Mauna Kea, Matson Navigation Company.

Steam Schooners

S. S. E. H. Meyer, S. S. H. F. McCormick, S. S. Munami, McCormick Steamship Company; S. S. Scotia, Pacific Lumber Transp. Co.; S. S. A. M. Baxter, J. H. Baxter & Company.

Company Safety Awards, 1939

First Place (Blue Certificate)

Steam Schooner Division: P. & L. Transportation Co.

Freighters — Matson Navigation Co.

Passenger Vessels, Class "A": Matson Navigation Co.

Passenger Vessels, Class "B": Alaska Steamship Co.

Passenger Vessels, Class "C": American President Lines.

Second Place (Green Certificate)

Steam Schooner Division: J. H. Baxter & Co.

Freighters: McCormick Steamship Co.

Passenger Vessels, Class "A": American President Lines.

Passenger Vessels, Class "B": American President Lines.

Passenger Vessels, Class "C": Matson Navigation Co.

Brine Tank Circulators

For Baby Tuna Clippers

By David W. Dickie, N. A. and M. E.

The circulator for the brine tank on the baby tuna clipper has some characteristics that are not inherent in the ice tank circulator:

(1) As the vessel rolls, the brine surges from side to side, causing a variation in the power required to overcome the changing head.

(2) The power available is limited by the capacity of the generators, requiring that the circulator be designed to use the smallest possible motor.

(3) Direct current is used aboard the tuna clippers, and extreme changes in head will produce sparking at the commutator brushes of the motor.

(4) A field rheostat of some kind is necessary to start the circulation at a slow velocity and increase the revolutions of the propeller as the velocity of the brine increases.

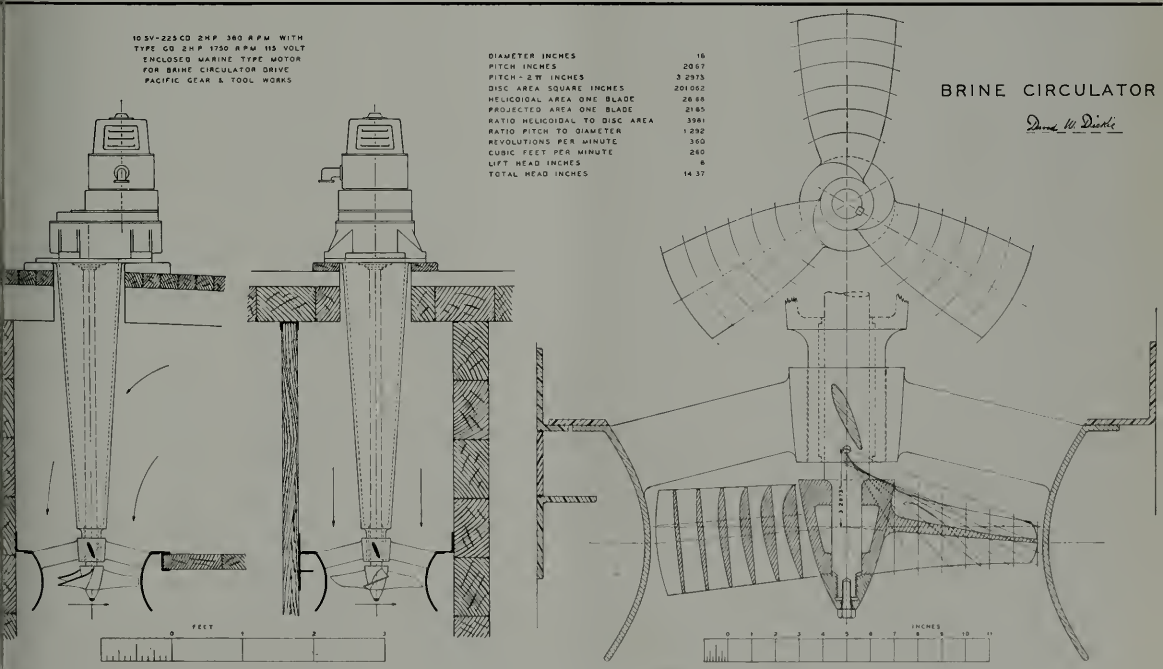
(5) Due to the surge, it is necessary to have the reduction gears designed to resist an overload of 2½ times that necessary where the brine tank is at rest under constant head.

(6) Investigation showed that a comparatively large, slower-turning propeller will deliver more water than a small, fast-turning propeller with the same size motor. The efficiency increases with the diameter of the propeller up to a certain point, and then decreases with increase of diameter beyond that point.

(7) The standard manufactured circulators on the market are usually fitted with alternating current motors, and when direct current is the only power available it is necessary to make a special design to suit the conditions. Horizontal direct current gear head motors are made in commercial sizes, but vertical D.C. gear reduction motors are usually custom made.

(8) The temperature that prevails in the tropics runs from 95 to 100 degrees Fahrenheit on occasion, and the motor to be satisfactory must have a rating of 120 degrees continuous operation. A shade over the brine tank will keep the rays of the sun from the motor.

(9) It is impossible to exclude the



presence of animal and vegetable sea growths and fish particles from the brine tank. For that reason it is important that the frame of the circulator below water be made to exclude such contamination. Care must be taken to properly lubricate the lower bearing.

(10) There are three types of propeller in use in the circulators, and the diameter and pitch are governed by the type used. The drawing shows the propeller used in propeller pumps. Some manufacturers use a propeller similar to that used on a boat. The Ole G. Halvorsen Company use a propeller designed to give a parallel race.

Head

Some difference exists in the commercial use of the term head. It is divided into two parts, head due to lift and head due to capacity. Some of the curves that came from the manufacturers were plotted giving the capacity of the circulators at various lift heads, while others were plotted for various total head, lift plus capacity. The majority of the manufacturers mean lift lead only when speaking of the head of the circulator, and where head is not mentioned 3" to 4" lift head is usually understood.

This may be the reason for the failure of the circulators in the instances where they have been tried aboard ship.

The amount of lift head must necessarily be sufficient to overcome the extreme conditions caused by the surge of the brine in the tank. Ordinarily 3" to 4" lift head is all that is used in ice tank practice, but opinion as to lift head necessary in the case of brine tanks aboard these vessels ranges from 6" to 12".

For example, if 6" lift head is selected, the velocity due to lift $V^2 = 2gh$ becomes $V^2 = 2 \times 32.16 \times .5$ and $V = 5.671$ feet per second.

The velocity due to capacity is governed by the diameter of the propeller. As the propeller is increased in diameter the velocity through the propeller opening is decreased if the quantity of water is held constant.

In this design the coil raceway is 2' - 9" high and 2' - 2" wide, having an area of 5.96 square feet. Across the coil raceway there are 16 runs of 1" pipe 23" long = 3.36 square feet obstruction. 5.96 − 3.36 = 2.6 square feet net area. 2.6 square feet x 100 feet per minute velocity of water through the coil = 260 cubic feet per minute that has to pass through the propeller of the circulator.

If we assume a propeller 16" in diameter, the area of the circle is 1.3962 square feet. 260 cubic feet per minute divided by 1.3962 square feet equals 186.2 feet per minute or 3.107 feet per second. Adding the lift and capacity velocities:

5.671 feet per second due to lift
3.107 feet per second due to capacity

8.778 feet per second due to total head.

$(8.778)^2 = 77.0533 = 2 \times 32.16 \times h$, and $h = 1.198$ feet, or 14.376 inches total head.

As the power required is a function of the total head, if we wish to increase the lift head a little we can increase the diameter of the propeller and reduce the capacity head; but if it is desired to increase the lift head from 6" to, say, 8", the propeller will have to be 18" diameter and the motor 3 horsepower. Above 8" lift head the circulator will require a 5-horsepower motor to maintain the same capacity in cubic feet per minute.

Corrosion

Corrosion of the frame and propeller of the circulator has to be prevented, if possible. In the ice tanks the brine is made of fresh water and salt (sodium chloride) which is treated to make it non-corrosive to iron. Sea water contains 245 grains per gallon of magnesium chloride, and as the sea water and brine are circulated in the fish wells they cannot be treated, because the treated water imparts an objectionable taste to the fish. The research department of the International Nickel Company recommends that the iron castings be made of Ni-Resist, the shaft of "K" Monel and the bearing of "S" Monel. All iron castings should be galvanized periodically.

Bronze will eat the zinc galvanizing off the coils if the castings are made of that metal. The use of Monel metal for frame and propeller are ideal but the expense discourages its use.

Shrinkage

The wood structure of the brine strengthening tank is alternately wet and dry, and periodically the vessel is in port with everything opened up for airing and sweetening. As a result, quite a little swelling and shrinking takes place. To allow for movement, the spider is free to move up and down on the conical frame of the circulator.

If it were not for the fact that the deck twists a little with the straining of the ship it would be better to omit the spider, but there is danger of the propeller striking the raceway if it is not held in place.

Another solution is to increase the clearance between the propeller and the raceway and omit the spider. This decreases the efficiency of the circulator.

Electric Power Load For Auxiliaries And Lighting

In the August, 1939, article on refrigeration in Pacific Marine Review, attention was called to the fact that when an attempt was made to correct the refrigeration, the electrical load exceeded the capacity of the generators.

Assume the time for cooling the fish from 86 to 0 degrees is set at 24 hours, and assume further that the vessel has 8 wells and 2 bait boxes of a capacity of 40,000 pounds of sea water each. Each of two wells, previously stowed with 32,000 pounds of fish and 8,000 pounds of brine are finishing cooling to zero, and two wells have just been stowed with the cooling process started.

The electrical load of the Pak-Ice boat under such conditions would be:

Lights, 1,500 watts; miscellaneous, 150 watts	2.0 H.P.
Fathometer, 300 watts; radio, 2,000 watts	3.0 H.P.
Searchlight, 1,500 watts	2.0 H.P.
Two blowers, 1¼ H.P. each	2.5 H.P.
Two 10" vertical propeller pumps, water supply to bait wells and tanks 1,840 gallons per minute each, 20 foot head, 15 H.P.	30.0 H.P.
Four 6" x 6" double cylinder ammonia compressors, 360 r.p.m., 30-H.P. motors operating simultaneously at 25 H.P. each	100.0 H.P.
One compressor jacket water and sanitary pump 2" x 2½" centrifugal	1.5 H.P.
One 5" x 6" centrifugal pump for condenser service	7.5 H.P.

If three 7" x 7" double-cylinder ammonia compressors turning 327 revolutions per minute are used they require 35 horsepower each when operating simultaneously on the latent heat load. See February, 1940, article.

Brine Strengthening Tank	
One vertical 16" circulator	2.0 H.P.
One 3" x 3" centrifugal combined supply and circulating pump	5.0 H.P.
Freezing System	
One 6-section Pak-Ice machine	10.0 H.P.
Ten 2" x 2½" centrifugal pumps from wells and boxes to Pak-Ice machine, 1½ H.P. each	15.0 H.P.
One 4" x 3" centrifugal pump drawing water from the Pak-Ice machine to the wells and boxes	5.0 H.P.
Circulating System	
One 5" x 6" centrifugal pump drawing from the bottom of and delivering to the top of the wells and boxes	7.5 H.P.
Service Pumps	
One 3½" x 4" centrifugal bilge pump	5.0 H.P.
One 2" x 3" centrifugal deck wash pump	3.0 H.P.
Refrigeration, Ship's Stores	
One 3" x 3" single-cylinder ammonia compressor	2.2 H.P.
One 1½" x 2" centrifugal pump for small condenser	1.0 H.P.
Fuel oil transfer pump, 2" rotary	2.0 H.P.
Fresh water transfer pump, 2" rotary	2.0 H.P.
Grinder, 7" wheels	.5 H.P.
Drill press, ½" hole in steel	.5 H.P.
Cargo winch	25.0 H P.
Anchor windlass	7.5 H.P.

All of the units are not running at the same time, but actually to carry on freezing as outlined requires 177 horsepower, which, with a little margin, requires two 90-K.W. generators driven by 135-horsepower auxiliary engines.

With the same assumptions as to time and quantities, the load is distributed differently on the boat with individual coils in the wells, but there is little or no difference in the electrical load. However, with the coil system there must be no stoppage of the circulating pumps once the fish are stowed in a well.

The electrical load on the tuna boat, using individual coils in each well, follows:

Lights, 1,500 watts; miscellaneous, 150 watts	2.0 H.P.
Fathometer, 300 watts; radio, 2,000 watts	3.0 H.P.
Searchlight, 1,500 watts	2.0 H.P.
Two blowers, 1¼ H.P. each	2.5 H.P.

Two 10" vertical propeller pumps, water supply to bait wells and boxes 1,840 gallons per minute each, 20 foot head, 15 H.P.	30.0 H.P.
Four 6" x 6" double cylinder ammonia compressors, 360 r.p.m., 30-H.P. motors operating simultaneously at 25 H.P. each	100.0 H.P.
One compressor jacket water and sanitary pump, 2" x 2½" centrifugal	1.5 H.P.
One 5" x 6" centrifugal pump for condenser service	7.5 H.P.
Brine Strengthening Tank	
One vertical 16" circulator	2.0 H.P.
One 3" x 3" centrifugal combined supply and circulating pump	5.0 H.P.
Freezing Circulation	
Ten 5" x 5" centrifugal pumps, 600 gallons per minute, 12 foot head, 3 H.P. each	30.0 H.P.
General Service	
Two 4" centrifugal transfer pumps also connected to the bilge and sea, 7½ H.P. each	15.0 H.P.
Refrigeration, Ship's Stores	
One 3" x 3" single-cylinder ammonia compressor	2.2 H.P.
One 1½" x 2" centrifugal pump for small condenser	1.0 H.P.
Fuel oil transfer pump, 2" rotary	2.0 H.P.
Fresh water transfer pump, 2" rotary	2.0 H.P.
Grinder, 7" wheels	.5 H.P.
Drill press, ½" hole in steel	.5 H.P.
Cargo winch	25.0 H.P.
Anchor windlass	7.5 H.P.

All the units that are actually running simultaneously require 176 horsepower.

The system using one brine tank for cooling and circulating sea water and another for cooling and circulating 22 per cent brine at zero has not been tried yet.

In addition to the two 90 K.W. generator sets, the vessel needs a 32-volt battery and a 20-K.W. generator set to take care of the bilge, fire, deck wash and other pumps and motors about the ship.

A Mystery

(Continued from Page 38)

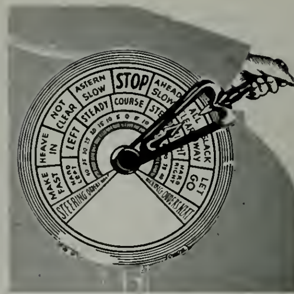
When the Admiral Karpfanger was about 140 days from her last port, and nothing had been seen of her, she was given up as lost, and a very intensive investigation was planned by the Seeamt in Hamburg.

The relatives of the sixty men of the crew formed a committee to do their utmost to further this investigation. After long months of inquiry, and even sending a small vessel of the Chilean Navy along the Coast of Terra del Fuego and examining all the islands around Cape Horn, on January 19, 1939, the Seeamt in Hamburg came to the conclusion that the ship must have been lost between the 12th and 16th of March, and most surely by running into an iceberg. The area in which the accident occurred was estimated to be South of 50° South latitude and between longtitude 100° to 120° West.

From different parts of Germany came tales from clairvoyants, that the crew of the ship was still alive, but on an island and not able to get in touch with the rest of the world. Looking at the matter from the viewpoint of a seafaring man, it may have been possible that the crew had a chance to leave in the boats before the ship went down. There have been records of trips in lifeboats of more than 3,000 miles, and possibly the boats may have steered North to get out of the westerly winds into better weather, and then sailed to the Northwest, running before the Southeast trades. By taking such a course, the boats may have reached the neighborhood of the Tuamotu Islands, and in trying to land on some island, may have lost their boats in such an attempt.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Some Laws Governing Navigation and Ship Operation II

QUESTION

If the crew refuses to go to sea through the alleged unseaworthiness of the ship, what should be done?

ANSWER

If a majority of the crew of any vesesel bound on any voyage shall, before the vessel shall have left the harbor, discover that the vessel is unseaworthy, and shall require such unfitness to be inquired into, the master shall, upon the request, forthwith apply to the United States consul, if in a foreign port; or if in a United States port, to the judge of the district court of that judicial district, if he shall there reside, or if not, to some justice of the peace of the city, town or place; for the appointment of surveyors, taking with him two or more of the crew who shall have made such request; and any master refusing or neglecting to comply with these provisions shall be liable to a penalty of $500.

The consul, judge or justice shall, upon such application of the master, issue his precept, directed to three persons in the neighborhood, the most experienced and skillful in maritime affairs that can be procured. It shall be the duty of such surveyors to repair on board such vessel and to examine the same in respect to the defects complained of, and make reports to the consul, judge or justice, as the case may be, in writing, whether in any or in what respect the vessel is unfit to proceed on the intended voyage, and what addition of men, provisions or stores, or what repairs or alterations will be necessary; and upon such report the consul, judge or justice shall adjudge and shall indorse on his report his judgment whether the vessel is fit to proceed on the intended voyage, and, if not, whether such repairs can be made or deficiencies supplied where the vessel then lies, or whether it is necessary for her to proceed to the nearest or most convenient place where such supplies can be made or deficiences supplied; and the master and the crew shall in all things conform to the judgment. The master shall, in the first instance, pay all the costs of such review, report or judgment, to be taxed and allowed on a fair copy thereof, certified by the consul, judge or justice. But if the complaint of the crew shall appear upon the report and judgment to have been without foundation, the master shall deduct the amount thereof, and of reasonable damages for the detention, to be ascertained by the consul, judge or justice, out of the wages of the complaining seamen.

If, after judgment that such vessel is fit to proceed on her intended voyage, the seamen refuse to proceed on the voyage, they shall forfeit any wages that may be due them.

QUESTION

Where will you find listed the life-saving and fire-fighting equipment required to be carried by your vessel?

ANSWER

On the vessel's certificate of inspection.

QUESTION

What is the law concerning time off duty for licensed officers before taking charge of a watch on sailing day?

ANSWER

It shall be unlawful for the master, owner, agent or other person having authority, to permit an officer

Deck Officers' Licenses for March

Name and Grade	Class	Condition
SEATTLE		
T. C. Spencer, Master	CWSS, any GT	O
C. Nilsen, 2nd Mate	SS, any GT	RG
J. D. Knox, 2nd Mate	SS, any GT	RG
PORTLAND		
E. R. Hood, Master-Pilot	CWSS, 500 GT	RG
SAN PEDRO		
D. Diefer, Master	SS, any GT	O
K. G. MacLean, Master-Pilot	SS, 20,000 GT	RG
W. Horthen, 2nd Mate	SS, any GT	RG
O. M. Robberstad, 2nd Mate	SS, any GT	O
C. W. Royston, 2nd Mate	SS, any GT	RG
A. W. Beavers, 3rd Mate	SS, any GT	O
F. W. Hager, 3rd Mate	SS, any GT	O
R. S. Schreiber, 3rd Mate	SS, any GT	O
SAN FRANCISCO		
R. Goorgian, Master	SS, MS, any GT	RG
E. K. H. Roeben, Master	SS, MS, any GT	RG
N. W. Anderson, Chief Mate	SS, any GT	RG
J. H. Barnhart, Chief Mate	SS, any GT	RG
R. G. Tatterson, Chief Mate	SS, any GT	RG
E. R. Tollefsen, Chief Mate	SS, any GT	RG
R. D. Moseley, 2nd Mate	SS, any GT	O
T. E. Bryant, 2nd Mate	SS, any GT	RG
F. E. Wilson, 2nd Mate	SS, any GT	RG
K. S. Castle, Jr., 3rd Mate	SS, any GT	O

of any vessel to take charge of the deck watch of the vessel upon leaving or immediately after leaving port, unless such officer shall have had at least six hours off duty with the twelve hours immediately preceding the time of sailing. Any violation of this section shall subject the person or persons guilty thereof to a penalty of $100.

QUESTION

What is the law concerning watchmen and fire patrolmen on passenger vessels?

ANSWER

Vessels carrying passengers shall during the nighttime keep a suitable number of watchmen in all passenger quarters and on each deck.

All watchmen shall be under the direct charge of the master or officer in command at the pilot house at fixed intervals of not longer than every hour. Cabin watchmen and cabin patrols on duty in the nighttime shall have in their possession while on such patrol duty a suitable and efficient dry-battery flashlight.

The uniform of the night watchman shall be so conspicuous as to be readily distinguished from other persons, and the coat or sweater marked with a rating badge worn on the left sleeve, marked "Watchman," and front of cap marked "Watchman."

Watchmen or patrolmen shall not be required to perform any other duty while on watch.

On all passenger vessels having berthed or stateroom accommodations for passengers, there shall be maintained while passengers are on board an efficient fire patrol so as to cover completely all parts of the vessel accessible to passengers or crew at 20-minute intervals between the hours of 10 p. m. and 6 a. m. except machinery spaces, occupied passenger or crew sleeping accommodations, and cargo compartments which are inaccessible to passengers or crew while the vessel is being navigated.

Failure of a patrolman to follow a prescribed route, or to record each station within a definite time, shall be entered on the record, along with the reason for the irregularity.

The patrolman shall report to the bridge every hour on vessels where the fire patrol system is not equipped with a recording apparatus in the control stations. In vessels requiring more than one patrol route, one patrolman may contact the others and make the joint report to the bridge.

A patrolman while on duty shall have no other tasks assigned to him. He shall be provided with a flashlight, and shall wear a distinctive uniform or badge.

In the case of vessels of non-inflammable construction which are fitted with an approved automatic fire-detecting and alarm system in public spaces, the patrol throughout the entire patroled area may be at one-hour intervals.

QUESTION

What is the law concerning the manning of vessels and percentage of crew?

ANSWER

No vessel of 100 gross tons and upward shall be permitted to depart from any port of the United States unless she has on board a crew not less than 75 per cent of which, in each department thereof, are able to understand any order given by the officers of such vessel, nor unless 65 per cent of her deck crew, exclusive of licensed officers and apprentices, are of a rating not less than able seaman.

Seamen rated able seamen on one year's service shall not in any case compose more than one-fourth of the number of able seamen required by this section to be employed upon any vessel.

Upon each departure of any vessel of the United States from a port of the United States, 75 per cent of the crew, excluding licensed officers, shall be citizens of the United States, native-born or completely naturalized, unless the Secretary of Commerce shall, upon investigation, ascertain that qualified citizen seamen are not available, when, under such conditions, he may reduce the above percentage.

The owner, agent or officer of any such vessel who shall employ any person in violation of the provisions of this section shall be subject to a

penalty of $500 for each offense.

Upon each departure from the United States of a cargo vessel in respect of which a construction or operating subsidy has been granted, all of the crew (crew including all employees of the ship) shall be citizens of the United States, native-born or completely naturalized.

Upon each departure from the United States of a passenger vessel in respect of which a construction or operating subsidy has been granted, not less than 90 per cent of the entire crew, including all licensed officers of any such vessel, shall be citizens of the United States, native born or completely naturalized.

Any member of the crew not required by this section to be a citizen of the United States may be an alien only if he is in possession of valid declaration of intention to become a citizen of the United States, or other evidence of legal admission to the United States for permanent residence. Such alien, as above defined, may be employed only in the steward's department on passenger vessels.

The owner, agent or officer of any such vessel who knowingly employs any person in violation of the provisions of this act shall, upon conviction thereof, be fined $50 for each person so employed.

QUESTION

What is the penalty for neglect of duty?

ANSWER

Suspension or revocation of license.

QUESTION

What is the Oil Pollution Act, and to whom does it apply?

ANSWER

When used in the "Oil Pollution Act, 1924," unless the context otherwise requires:

(a) The term "oil" means oil of any kind or in any form, including fuel oil, oil sludge and oil refuse;

(b) The term "person" means an individual, partnership, corporation or association; any owner, master, officer or employee of a vessel; and any officer, agent or employee of the United States;

(c) The term "coastal navigable waters of the United States" means all portions of the sea within the territorial jurisdiction of the United States, and all inland waters navigable in fact in which the tide ebbs and flows;

(d) The term "Secretary" means the Secretary of War.

Except in case of emergency imperiling life or property, or unavoidable accident, collision or stranding, and except as otherwise permitted by regulations prescribed by the Secretary as hereinafter authorized, it shall be unlawful for any person to discharge, suffer or permit the discharge of oil by any method, means or manner into or upon the coastal navigable waters of the United States from any vessel using oil as fuel for the generation of propulsion power, or any vessel carrying or having oil thereon in excess of that necessary for its lubricating requirements, and such as may be required under the laws of the United States and the rules and regulations prescribed thereunder. The Secretary is authorized and empowered to prescribe regulations permitting the discharge of oil from vessels in such quantities, under such conditions and at such times and places as in his opinion will not be deleterious to health or sea food, or a menace to navigation, or dangerous to persons or property engaged in commerce on such waters, and for the loading, handling and unloading of oil.

Any person who violates this act, or any regulation prescribed in pursuance thereof, is guilty of a misdemeanor, and upon conviction shall be punished by a fine not exceeding $2,500, nor less than $500, or by imprisonment not exceeding one year nor less than thirty days, or by both such fine and imprisonment, for each offense. And any vessel (other than a vessel owned and operated by the United States) from which oil is discharged in violation of this act, or any regulation prescribed in pursuance thereof, shall be liable for the pecuniary penalty specified in this section, and clearance of such vessel from a port of the United States may be withheld until the penalty is paid, and said penalty shall constitute a lien on such vessel, which may be recovered in proceedings by libel *in rem* in the district court of the United States for any district within which the vessel may be.

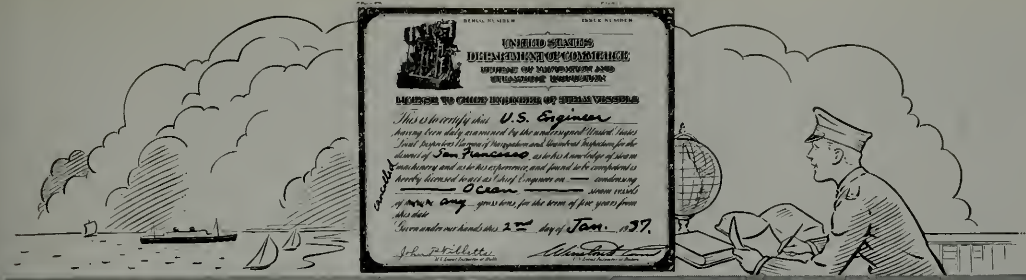
QUESTION

When and where are life-lines required?

ANSWER

Air ports 16 inches or more in diameter in the hull of all passenger vessels that open into the passageways shall have a life-line securely fastened overhead within the passageway. This life-line shall be not less than 2 inches in circumference, knotted every 3 feet, and of sufficient length to reach the water at the lightest seagoing draft.

On vessels of classes (A) and (B), one of the lifeboats on each side of a vessel shall be of suitable size and design for doing emergency work at sea. Each of these boats shall be provided with at least four life-lines fitted to a span between the davit heads, of sufficient length to reach the water at the vessel's lightest seagoing draft.



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Feed Water Treatment VI Boiler Compounds

QUESTION

What are boiler compounds?

ANSWER

Boiler compounds are chemicals or combinations of chemicals distributed under a trade name, specifically intended for use in treatment of boiler water or feed water.

QUESTION

What are some of the chemicals to be found in compounds?

ANSWER

Table I is a listing of 24 different compounds which have been used for boiler water treatment for marine boilers over the last 30 years, as analyzed by an important chemical firm.

The figures are in per cent by weight, but do not necessarily total 100 per cent in each case, due to inclusion of inert or inactive materials not listed.

The first U. S. Navy boiler compound was adopted in 1911, and consisted of trisodium phosphate, 10%; potato starch, 1%; tannic acid, 2% in form of tannin bearing organic material; and the rest soda ash. Increased pressures and changes in boiler design, plus experience gained, caused the Navy again to investigate the subject, with the result that in 1933 they standardized on a compound consisting of 47% disodium phosphate, 44% soda ash and 9% corn starch. The starches seem to change the surface tension or otherwise improve the water to prevent foaming and carry-over.

In bringing out this compound, they emphasized that it was designed for boilers using distillation for make-up. The dosage is regulated to control alkalinity, holding

COMPOUND	Sodium Carbonate	Sodium Bicarbonate	Caustic Soda	Sodium Silicate as SiO_2	Sodium Aluminate	Sodium Chromate	Sodium Dichromate	Trisodium Phosphate	Sodium Sulfate	Sodium Acid Sulfate	Sodium Zincate	Zinc	Sodium Chloride	Sugar	Total Organic	Water
I			20.16												29.47	50.37
II			20.96								7.14		5.30			66.26
III			16.76					35.65								46.37
IV								1.04							9.76	87.36
V	10.50							4.69							4.26	80.25
VI	5.74												0.5		8.56	82.07
VII				4.5										11.2		83.1
VIII															10.00	90.00
IX											10.0				32.0	50.0
X	46.49				3.00										34.56	14.88
XI	28.10	41.97										7.6			12.0	12.0
XII				26.93											Trace	
XIII				24.48											Trace	
XIV	51.6			16.9												29.2
XV			23.3					Trace							17.44	59.26
XVI			19.17												5.35	75.49
XVII			28.6												5.36	66.4
XVIII		1.16						27.34	18.74						22.09	37.17
XIX		2.38				9.36		26.58	29.19							31.29
XX									96.07						1.98	0.7
XXI			11.7					1.2							7.1	70.0
XXII			35.0												23.0	31.0
XXIII						9.86			86.3							4.13
XXIV							11.3		12.8	73.2						5.4

Table I

Matson's Lurline, Mariposa, Monterey, Matsonia, are the fastest four in American oversea passenger service.

it to .4 to .7 per cent of normal.*

Table II indicates the relation between pH values, which are used in most literature on alkalinity and per cent normal measure as used in the Navy instruction.

pH Value	Alkalinity % Normal
10	.01
11	.1
12	1.0
13	10.0
14	100.0

TABLE II

Thus the Navy .4 to .7 per cent N means pH 11 and pH 12.

QUESTION

What two conditions, varying independently, must be separately controlled?

ANSWER

The two variables are: (1) alkalinity for corrosion prevention; (2) sulphate or hard scale forming compounds to be changed over to insoluble sludge forming compounds.

QUESTION

What chemicals accomplish these results?

ANSWER

Nearly all chemicals have some effect on alkalinity, some more and some less. Thus in treating for condition (2) above, we may also affect alkalinity, or condition (1). Strong alkalies naturally are the most effective in increasing alkalinity, such as caustic soda and trisodium phosphate.

As to condition (2), scale-forming, those substances whose solubility in water increases with temperature precipitate out as sludge and can be passed through the blow-down; while conversely those substances whose solubility decreases with temperature deposit as adherent or hard scale. For example, calcium sulphate, calcium silicate and calcium hydrate deposit as scale on heating surfaces, while calcium carbonate and calcium phosphate separate out as sludge.

Prevention or safety consists in adding and maintaining an excess of carbonate or phosphate so as to combine with the calcium and sludge down as carbonate or phosphate sludge.

Sodium carbonate (soda ash) has long been used for this purpose, but it also increases alkalinity. It furthermore tends to dissociate at boiler temperatures, requiring a great deal more than would be needed otherwise, which may raise alkalinity above a desirable value. High alkalinity causes foaming, and it is believed to contribute to cracking of steel under stress.

QUESTION

What scale preventives are stable at boiler temperatures?

ANSWER

The phosphates in general are preferred as maintaining their chemical identity at high temperatures. The phosphates available are trisodium phosphate, highly alkaline; disodium phosphate, less alkaline; monosodium phosphate, slightly acid and dangerous to use, as any acid would be.

QUESTION

How can condition (1) alkalinity, and condition (2) scale prevention, be controlled simultaneously?

ANSWER

By simultaneously maintaining in the boiler water of each boiler a phosphate-to-sulphate ratio high enough to prevent the formation of hard scale, adjusting this with no thought to alkalinity, at the same time holding alkalinity high enough, using alkalinity control chemicals to prevent corrosion, but low enough to avoid embrittlement or wet steaming.

QUESTION

What is the result of using the more alkaline phosphates?

ANSWER

When water is used with a high content of calcium bicarbonate, as bunkered in South Atlantic and Gulf ports, San Pedro, on lower California Coast, and various British Channel ports, also water stored in cement-washed feed tanks, the trisodium and disodium phosphates would be needed in such quantities to supply the necessary phosphate excess as to give a great excess in alkalinity. This excess alkalinity could be lowered by use of acid compounds, but these are too dangerous to allow of general use.

QUESTION

What general recommendations can be made regarding the use of compounds?

ANSWER

No general recommendations can be made. The use of compounds

*Those interested are directed to Navy Department, Bureau of Engineering Instructions for Boiler Water Treatment, 1933. Obtain from Superintendent of Documents, Washington, D. C.; price 5 cents.

should be based on specific information as to the requirements of the boiler water and as to the chemical contents of the compound. Dosage and testing procedure should be determined on the advice of a competent chemical engineer.

QUESTION

Does the use of evaporated or distilled water make the problem of treatment simpler?

ANSWER

Condensate forms the bulk of feed for marine boilers. The make-up may be either distillate or bunker water. Considering the cost, it is an open question whether it is worth while to run the evaporators if reasonably good bunker water is available. Condenser leakage is an ever-present possibility and has a predominating influence in the character of feed water. Slight condenser leakage often results in more serious water conditions than would be caused by any conceivable raw water make-up.

The ratio of make-up to total feed is ordinarily about one per cent. The seepage of two lbs. of sea water introduces more dissolved salts into the boiler than does the use of one ton of New York water.

Also investigations have disclosed that a large part of feed contaminations has been accumulated while the water was stored in the double bottoms.

The amount of chemical required to treat one per cent of make-up of reasonably good raw water is so small and so inexpensive that it is preferred to the use of evaporators.

This concludes the series on this subject. We have not covered tests and test kits used in the engine room. If interest in this phase of the subject is indicated by correspondents, we may devote two articles to it.

Our next article opens a series on boilers.

To the Engineer On Shipboard

"The Chief" desires to make this series on boilers as practical as possible.

The boiler is the device in which heat energy is generated and controlled for use in the propulsion and auxiliary prime movers. It may therefore be styled the "heart" of any steam plant.

In a modern steam plant where the lubrication is automatic and the action of the turbine rotor depends entirely on an adequate flow of rightly-conditioned steam, that engineer is wise who devotes most of his attention to the boiler and its auxiliaries.

Nearly all new steamers are now being equipped with water tube boilers of 350 p.s.i. and up, and fitted with superheaters to give total temperatures of 750° F. In modern shoreside power stations, this would be considered low pressure and temperature.

A few experimental marine plants have gone to the 1,000-1,300 p.s.i. range with 950° F., and seem to be getting along fairly well.

The higher ranges of pressure give diminishing returns in fuel economy, but are showing very favorable results in ship economy (weight and space savings). Notwithstanding these modern trends in the new ships, it is still true that the majority of steamers in the American seagoing merchant marine are Scotch boiler reciprocating steam engine jobs. Out of our 1,320 seagoing merchant ships of 2,000 gross tons and up, there are 879 equipped with Scotch boilers, 370 with water tube boilers and 71 are diesel drive. Of the 1,249 steamers, 790 have reciprocating steam engines.

Perhaps these figures will indicate to the younger operating personnel the reason why the revised examination questions still contain queries on the Scotch boiler, triple expansion, reciprocating jobs which modern steam engineers consider obsolete.

What are your boiler troubles?

"The Chief."

Engineers' Licenses for March

Name and Grade	Class	Condition
PORTLAND		
G. M. Codman, Chief	SS, any GT	RG
W. A. Nagely, 1st Asst.	SS, any GT	RG
R. E. Huyt, 1st Asst.	SS, any GT	RG
JUNEAU		
W. F. Ulrich, 2nd Asst.	MS, any GT	RG
SAN PEDRO		
H. H. Clute, 1st Asst.	SS, any GT	RG
J. M. Steele, 2nd Asst.	SS, any GT	RG
J. L. Bushnell, 3rd Asst.	SS, any GT	O
F. Stasko, 3rd Asst.	SS, any GT	O
HOQUIAM		
H. L. Andersen, 1st Asst.	SS, any GT	O
SAN FRANCISCO		
J. Stasko, Chief	SS, any GT	RG
G. Hamblin, Chief	SS, any GT	RG
J. Duffy, Chief	SS, any GT	RG
T. W. Walsh, Chief	SS, any GT	RG
F. G. Graham, 1st Asst.	SS, any GT	RG
K. G. S. Robertson, 1st Asst.	SS, any GT	RG
K. M. Kuhn, 1st Asst.	SS, any GT	RG
E. M. Downing, 1st Asst	SS, any GT	RG
H. W. Forbes, 2nd Asst.	SS, any GT	O
J. Mowrey, 2nd Asst.	SS, any GT	O
H. E. Carper, 2nd Asst.	SS, any GT	O
A. J. McKenna, 2nd Asst.	SS, any GT	RG
F. B. Ryall, 2nd Asst.	SS, any GT	RG
B. H. Crichton, 2nd Asst.	SS, any GT	RG
M. S. Davis, 3rd Asst.	SS, any GT	O
J. H. Kane, 3rd Asst.	SS, any GT	O
J. J. Anderson, 3rd Asst.	SS, any GT	O
W. P. Cubitt, Chief	SS, any GT	O
W. E. Huff, Chief	MS, any GT	RG
J. H. Murray, Chief	MS, any GT	RG

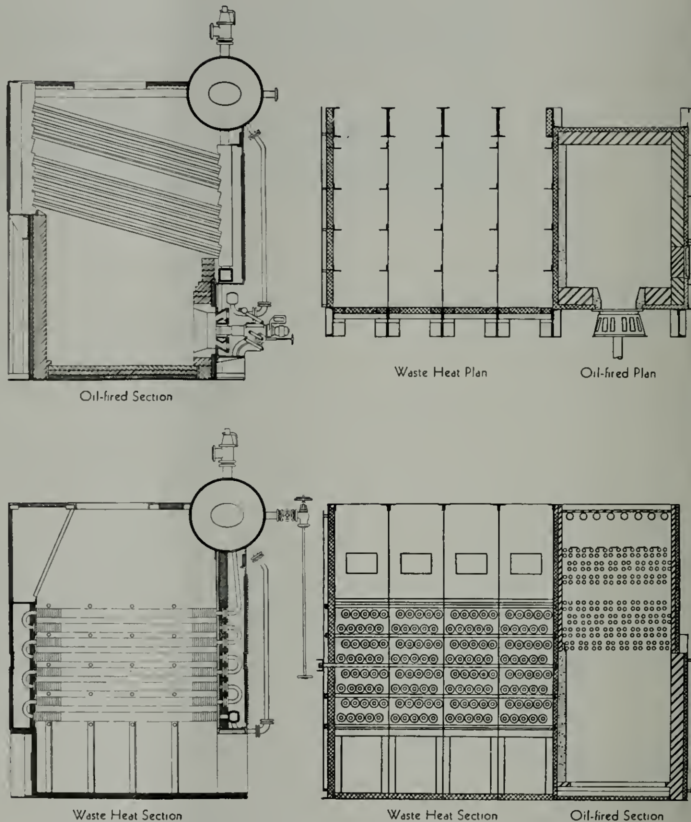
Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

A New Type Diesel Waste Heat Boiler

The motorship Mormacpenn, built for the U. S. Maritime Commission by the Sun Shipbuilding and Dry Dock Company, and chartered to the Moore-McCormack Line, Incorporated, is the first of four sisters, whose power plants are unique. Four 2,250-B.H.P. Busch-Sulzer diesel engines drive the single-screw shaft. Each engine has connection through an electric coupling to a pinion meshing with the single large gear wheel mounted on the propeller shaft.

The exhaust gases of the four main engines are passed through a Foster Wheeler combined waste heat and oil-fired boiler designed to generate steam at 50 lbs. pressure for heating, cooking and miscellaneous uses on the ship.

Operation of this type of boiler is quite different from that of the usual marine boilers, since heat for the generation of steam is obtained from either of two sources, or both in conjunction. The boiler is divided into two heating sections connected to a single steam drum; one section is the waste heat absorption portion, recovering heat from the exhaust gases of the main engines; and the other is a direct-fired boiler section of conventional design, heated by a single oil burner. The earliest installation of this sort was in the motorship Pennsylvania Sun, constructed by the Sun Shipbuilding and Dry Dock Company for the Sun Oil Company, and driven by a single 6,000-H.P. Sun-Doxford engine.



Sectional drawings of combination waste heat and direct-fired boiler to provide ship's steam requirements. The boiler consists of two sections. (1) an oil-fired, cross-drum, sectional-header unit, and (2) a cast iron, extended surface, waste heat recovery unit of the type commonly used with diesel engines, divided into four compartments, one for each engine. A single steam drum is common to all sections. The oil-fired section is shown at upper left and below it is the waste heat section. At lower right is a vertical section through both portions with waste heat compartments at the left and oil-fired section at the right. Upper right is a plan taken through the gas chambers.

Interesting modifications were involved in the Mormacpenn, since the diesel power equipment consists of four engines instead of one. Each of these engines is provided with its individual waste heat boiler section, which assures best performance and great flexibility. If the exhausts from all four engines were discharged into a single common chamber containing all of the heating surface for the exhaust gases, it would result in undesirable operation. For example, if two engines were operated and two idle, the gas velocity and heat transfer rate would be low, and performance unsatisfactory. Furthermore, if work were to be done on any of the elements in the waste heat section of the boiler, all four of the engines would have to be shut down. Having a separate gas passage for each engine permits shutting down one engine in order to work on the corresponding gas passage, which in itself is a great advantage.

Mechanical details of the boiler include a steam drum 36 inches in diameter and approximately 16 feet long, with connections to both direct-fired and waste heat sections. The elements in the waste heat portion are arranged horizontally, and are of composite construction, in which extended surface, gilled ring castings are shrunk upon 2-inch-diameter boiler tubes. This gives

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Consolidated Acquires

Shipbuilding Plant

At Orange, Texas

The Consolidated Steel Corporation of Texas, recently formed as a wholly-owned subsidiary of Consolidated Steel Corporation, Ltd., of Los Angeles, Calif., has purchased the properties of the Orange Car and Steel Company at Orange, Texas. The acquired property contains about 60 acres on a peninsula bounded by the Sabine River. The river at this point is 600 feet wide and 25 feet deep. The existing plant is equipped and is now being operated for the fabrication of structural, plate and reinforcing steel.

During the last war, the Southern Shipbuilding Company operated on this property. Five shipways were installed for the construction of vessels for the Shipping Board. The piling for these ways is in place and in good condition below the moisture line. With such excellent shipbuilding facilities as exist on this property, and having a deep-water outlet to the Gulf, Consolidated plans to enter the field for the construction of such craft as barges, tugs, trawlers and cargo boats.

The officers of the company are D. G. Henderson, president; Alden G. Roach, vice president; L. R. Earl, vice president; R. O. Cragin, secretary and treasurer; M. J. Tavis, assistant secretary and treasurer, and Charles H. Steele, former manager of Orange Car and Steel, sales manager of the new company.

Above:
D. G. Henderson, president.

Left:
Alden G. Roach, vice-president.

Right:
L. R. Earl, vice-president.

Headache Taken Out of "*Position Fix*" by the Hydrographic Office

A simplified method of determining the position of a ship or an airplane, which enables a navigator to determine his position in terms of latitude and longitude in a few seconds and with an accuracy of one-tenth of a mile, is assuming great importance to ocean commerce and modern, high speed air transportation.

This method, eliminating nearly all of the involved mathematical computation of older procedures, is based on use of pre-computed navigation tables which are being compiled and assembled by the Work Projects Administration in cooperation with the Hydrographic Office of the United States Navy. The WPA has assembled these tables in volumes covering 10 degrees of latitude, usable in both the southern and northern hemispheres.

Navigators may now obtain four volumes of these tables which are entitled "H. O. 214—Tables of Computed Altitude and Azimuth," covering all latitudes between 40 degrees south and 40 degrees north. An additional volume, which will be available this year, will cover the latitudes up to 50 degrees. Meanwhile, WPA workers are computing tables for the latitudes from 50 to 90 degrees. When this work and that which is projected is completed, it will mean that a navigator, on any ocean or over any land area of the globe, will be able to determine his position accurately and rapidly without resorting to involved, individual computation and logarithmic tables.

The science of navigation has always been to the uninitiated one of man's most mysterious devices for finding his way around. To mariners and aviators who are trained navigators, the science is nothing more than an exact mathematical procedure which makes use of certain observational and geographical data to fix the position of a ship in relation to the earth: that is, to determine its latitude and longitude.

Under ordinary conditions, a training period of at least eight months is required to take the mystery out of the process and develop facility in navigating. With the new tables it is estimated that the training period can be reduced to about six weeks.

In effect, the technique of celestial navigation is based upon the fact that at a given point of latitude and longitude, at a particular time, a particular angle (altitude angle) between the horizon and the sun or a known star will be observed.

A navigator, using the old method and wishing to check his position, would take a sextant sight upon the sun or a star which he could identify. Then, using the elements of time, his bearing from the celestial body and his assumed latitude and longitude, he would compute, by the use of special formulae, the altitude angle which corresponded to his assumed latitude and longitude. If the computed altitude were greater or less than the observed altitude, he would adjust his assumed position accordingly.

By using the "Tables of Computed Altitude and Azimuth" the navigator can find immediately the altitude angle and azimuth or bearing, which corresponds to his assumed latitude and longitude, without having to compute it. His position then can be immediately determined by comparing it with the observed data of his actual position and adjusting accordingly.

Since 1837 the method known as the Sumner Line or Line of Position has been the basis for practically all navigational position finding. On the 18th of December, 1837, Captain Thomas H. Sumner, an American Merchant Captain, was on a cruise from Charleston, South Carolina, to Greenock, Scotland. Uncertain of his position because of a heavy storm, he was able finally to take a sextant altitude of the sun. In attempting to plot this altitude for position, he accidently discovered, by taking different latitudes, that there were actually a series of positions on the earth where the altitude of any celestial body would be the same for any instant of time. For all practical purposes the joining of these series of positions formed a line which was at right angles to the bearing of the celestial body from the ship.

Obviously if a second celestial body were available on which a sight could be taken, a similar line of position could be determined for that body. The intersection of these two lines would definitely locate the position of the observer. The problem thus became one of determining the two correct Sumner lines of position by comparing computed and observed data and finding or plotting the intersection. "H. O. 214" provides a quick and easy method for doing this.

The value of these tables to present day navigation has attracted the attention of the entire navigating world. The first consideration of the Hydrographic Office was to make this rapid method available to our own mariners and aviators, and for that reason tables for the latitudes covering the United States and its territorial waters were the first to be compiled by the WPA workers. The extension of the work to include additional latitudes has benefited our own world-wide sea and air commerce and has brought requests for information and completed volumes from navigators and scientists of nearly all foreign countries.

All U. S. Government services, including the U. S. Navy, Coast Guard, Army Air Corps and the Coast and Geodetic Survey are now using these tables in all of their navigation and scientific work. And an increasing number of private seamen, yachtsmen and aviators of all nations are finding the easier method valuable. Among the commercial airlines using the tables is the Pan American Airways which has adopted the method on their routes to Europe and the Orient.

In a recent report on the value of the new navigation tables, Captain G. S. Bryan, Chief Hydrographer of the U. S. Navy, said: "These tables are of the utmost importance to modern,

(Page 68, please)

New Type Waste Heat Boiler

(Continued from page 54)

the strength of steel, the corrosion resistance of cast iron and a heat-absorbing surface six times that of the bare tubing. Positive direction of water flow through the tubes, which is essential for satisfactory performance, is effected by placing orifice plates in the downcomer pipes from the steam drum to the bottom header supplying the tubes. Waste heat boilers of this construction have been in service in large diesel-driven ships for twelve years. The direct-fired heating section is composed of straight tubes, expanded into forged-steel sectional headers, connected to the steam drum with 4-inch tubing and nipples.

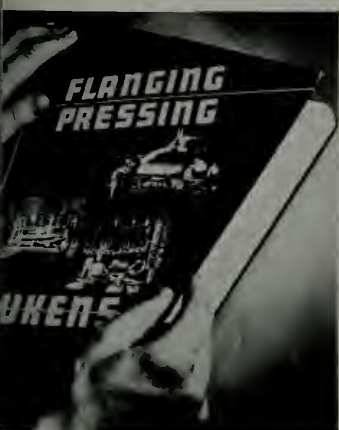
The entire boiler is designed for heavy duty, with framing and casing built to withstand pulsations set up by the exhaust. Exhaust gas chambers function effectively as mufflers, offering frequent changes in velocity and direction of the gases, without imposing appreciable back pressure. Ample insulation is used throughout to prevent loss of heat.

The combination of heating methods permits maximum efficiency in over-all ship operation by utilizing heat units otherwise lost up the stack when running the engines, and at the same time provides complete independence of engines through direct oil-firing, at any rate necessary to assure the steam required for ship's use. In other words, if the engines are run at low rating or shut down, the oil burner may be operated to make up any deficiency.

Literature of the Industry

Flanging and Pressing, a new illustrated 132-page manual published by the Lukens Steel Company.

In this book, designers and builders of vessels and marine equipment will find published for the first time useful data on flanged heads and pressed steel sections for boilers, bulkheads, buoys, mooring bitts and other marine products.



Clearly and attractively presented, with 77 photographs of various industrial applications, are detailed descriptions, drawings and tables of information on each style and size of head. A unique feature is the data, never before released, on heads larger than 15 feet in outside diameter, illustrated with such examples as the largest heads ever spun in one piece, formed of steel plates rolled on Lukens 206" (world's largest) plate mill.

Designing engineers will be particularly interested in the Lukens Flanged Only Head, spun in one piece from two different gages of steel plate, for use in a Scotch marine boiler. The finished head is 15'3" O.D., containing three large flue holes and two manholes. Other illustrations include a view of finished hot-pressed sections for Lukens Tanker Bulkhead System; welded steel blower casings fabricated from flanged only heads, for use in steam turbines; a whistling buoy equipped with large and small flanged and dished buoy heads; welded steel mooring bitts; steel buoys equipped with toed-in flanged heads, and one of six flanged and dished A.S.M.E. Code heads formed from naval brass.

Engineering data, published for the first time, cover the capacities of elliptical dished heads, as well as a complete description of flanged and reverse dished heads, dished only heads, flared and dished heads, flanged and conical dished heads and flanged hemispherical heads. Information on flue holes, handholes and manholes, handhole and manhole saddles and fittings, head machining and plate planing has been revised and expanded. There are additional circle weights and a new size card.

Useful to designers, estimators and purchasing agents are the prices for forming each type and size of head, together with quantity differentials on each group of products. To make matters easier for the purchaser, simple tables eliminate any need for higher mathmetics in calculating dimensions and weights of spun and pressed products.

Measurement of Vessels; 152 pages 8"x10½", with numerous diagrams and tables, paper bound, in loose leaf form, published by the Bureau of Marine Inspection and Navigation of the U. S. Department of Commerce.

This book is very important. It sets forth the regulations (effective March 1, 1940) for interpreting laws relating to admeasurement of vessels, together with: the text of the said laws of the United States; the Suez Canal regulations, and the Panama Canal rules.

The contents are in five parts, and each part is separately indexed. These main divisions are:

Part I. Bureau of Marine Inspection and Navigation regulations for the tonnage measurement of vessels.

Part II. Laws of the United States relating to the measurement of vessels.

Part III. Suez Canal special tonnage certificates.

Part IV. Measurement of United States naval vessels for Suez Canal.

Part V. Panama Canal measurement.

Every ship designer, ship operator and master should have a copy of this book. Applications for copies should be made to the Bureau of Marine Inspection and Navigation, United States Department of Commerce, Washington, D. C.

On the Ways — SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

New Shipbuilding Firm For Southern California

Southern California Shipbuilding Company Organized

A group of prominent Los Angeles and Long Beach industrialists has completed the formation of a new shipbuilding firm, to be known as **Southern California Shipbuilding Company.** A site for a shipbuilding yard has been obtained on the eastern end of Terminal Island at the entrance of Long Beach Inner Harbor.

The program for yard development calls for the early construction of four ways suitable for the erection of vessels of the United States Maritime Commission types. This new company will be an active bidder on contracts for private interests as well as on U. S. M. C. contracts.

Matson Orders Four C-3s

The Maritime Commission's C-3 cargo ship design has been selected for the first new construction undertaken by an American intercoastal shipping operator in more than ten years.

Four vessels of this type have been ordered by the **Matson Navigation Company** for service between New York and Hawaii, in a revival of shipbuilding for the domestic services. Two of these vessels are to be built at **Federal** and two at **Newport News.**

One of the important contributions which this type of ship can make to efficient operation and improved service for shippers is indicated by the fact that its 16½-knot speed is expected to reduce the present running time of 45 days between New York and Hawaii to approximately 28 days.

The C-3 design, developed by the Maritime Commission's technical experts, is a ship of approximately 492 feet overall with a beam of 69.6 feet, 11,900 tons deadweight, equipped with the most modern cargo handling devices and propulsion machinery.

Seattle-Tacoma Laying Keels

At the big new Tacoma yard of the **Seattle - Tacoma Shipbuilding Corporation,** the schedule for construction on the five C-1 cargo motorships which that firm is building for the U. S. Maritime Commission has been tentatively revised as follows:

Hull No. 1 had keel laid March 5, will be launched September 1 and delivered January 1, 1941. The corresponding dates for the other four are:

Hull No. 2, April 15, 1940; October 1, 1940, and February 1, 1941.

Hull No. 3, September 10, 1940; March 1, 1941; June 1, 1941.

Hull No. 4, October 10, 1940; April 1, 1941; July 1, 1941.

Hull No. 5, March 10, 1941; August 1, 1941; October 1, 1941.

The layout of this entirely new shipbuilding plant has received much praise from visiting shipbuilding experts and reflects great credit on President Lamont and his corps of technical assistants.

Moore Dry Dock Company to Deliver Sea Arrow

The Moore Dry Dock Company are receiving consignments of propulsion machinery for the Sea Arrow, and are busy installing them in the engine room of that vessel. The tentative date set for delivery is June 13. This means that early in June, for the first time in many years, San Francisco Bay will witness the trial trip of a large seagoing merchant vessel.

This yard is now very busy with: two large new vessels alongside the outfitting dock having their machinery and equipment installed; one new hull fast assuming ship shape on the building ways; and many major repair contracts.

Moore Dry Dock was low bidder for two new caissons for the two new U. S. Navy graving docks, one at Puget Sound, the other at Honolulu, and on April 26 contract for these caissons was awarded to Moore's at a total of $525,070.

Mississippi Shipping Bids Opened

The United States Maritime Commission on April 9 received the following bids for construction of three

combination cargo passenger ships for the Mississippi Shipping Company of New Orleans, La.:

From Newport News Shipbuilding and Dry Dock Company—

Fixed price basis: $3,825,000 for one vessel; $3,575,000 for each of two; $3,465,000 for each of three.

Adjusted price basis: $3,475,000 for one vessel; $3,250,000 for each of two; $3,150,000 for each of three.

Prices good until May 9, 1940.

From Bethlehem Steel Co., Inc., Sparrows Point Plant—

Fixed price basis: $3,564,000 for one vessel; $3,448,000 for each of two; $3,382,000 for each of three.

Adjusted price basis: $3,240,000 for one vessel; $3,135,000 for each of two; $3,075,000 for each of three.

Prices good until April 22, 1940.

Specifications call for a turbine-drive ship 490 feet long, 65 feet beam, a speed of 16½ knots and accommodations for 63 passengers, for Gulf to East Coast of South America service. The ships are identical with three now under construction for the same company at Bethlehem Sparrows Point Yard.

Contract for building these three steamers has been awarded to the Bethlehem Sparrows Point Plant at $3,075,000 each.

Two Awards--- Bids for Four

The Maritime Commission on April 20 announced that it had invited bids for the construction of four single-screw cargo ships for the **American Export Lines, Inc.**, of New York City. At the same time, it announced the award of a contract for construction of two single-screw tankers for the **Keystone Tankship Corporation** to the **Sun Shipbuilding and Dry Dock Company**, Chester, Pennsylvania, with the Commission paying only the cost of national defense features.

The four Export Line vessels are approximately the size of the Commission-designed C-1 ships, but are arranged in the same manner as the eight "Export" type vessels now built and building for the Export Line. They will have a designed speed of 16½ knots, steam turbine propulsion, and will be able to use harbors in Spain in which the somewhat larger "Export" type vessels would have difficulty.

Bids will be opened at 12 noon, May 21, 1940, in Room 4852, Department of Commerce Building, Washington, D. C.

The two tankers for the **Keystone Tankship Corporation** will be single-screw, 16½-knot tankers with a capacity of 129,000 barrels and an overall length of 512 feet. They will cost $2,602,000 each, although the present ship price will be reduced if additional vessels are ordered from the same shipyard. The tankers are of the T-2 type, on which bids were opened on March 19, 1940. Six other single-screw tankers, of nearly identical design, are now under construction for the **Socony-Vacuum Oil Company, Incorporated**, at the **Sparrows Point Yard of the Bethlehem Steel Company**, with the Commission paying the cost of national defense features.

Federal Busy---
Lykes Changing Names

On March 25 the **Federal Shipbuilding and Dry Dock Company** delivered a C-2, the Comet, last of their original contract for six of these vessels.

On March 18 they had delivered the Sea Fox, first of a contract for six Maritime Commission C-3 cargo steamers, and laid the keels for two destroyers on the ways, from which, on March 9, they had launched two similar vessels, the Plunkett and the Kearny.

The second C-3 vessel, launched on February 24, had her name changed from Sea Hound to Frederick Lykes. The third of this sextette, originally designated as Sea Panther, was launched on April 6 and christened Doctor Lykes.

The fourth C-3 steamer was launched April 27 and christened Almeria Lykes, in honor of the mother of the Lykes Brothers of New Orleans, to whose steamship line these vessels are allotted. The sponsor was Miss Almeria Holmes, 15-year-old great-granddaughter of the lady whose name was given to the ship.

Newport News Delivers

On March 27 **Newport News Shipbuilding & Dry Dock Company** delivered to the **Grace Line** the C-2 cargo vessel Santa Teresa, last of an original contract of four C-2s placed with the Virginia shipyard by the Maritime Commission. The other vessels in this program, all allocated to Grace Line services, were Nightingale, Stag Hound and Santa Ana.

Newport News is making good progress on the seven hulls of the C-3 modified combination passenger and cargo type, allocated to the round-the-world services of the **American President Lines.**

Keels for the first four of these ships were laid on October 2, November 13 and December 26, 1939, and on February 5, 1940. Since their home port will be San Francisco, the Pacific Coast is much interested in these vessels.

A Large Order

The **New York Shipbuilding Company,** Camden, New Jersey, report that they received in March, 1940, an order for two large cruisers for the U. S. Navy.

This yard, one of the largest in the United States, is specializing in naval work, and in addition to the above-mentioned order has the following under construction or on order:

Two destroyer tenders and one seaplane tender at the outfitting dock; one battleship and one seaplane tender on the ways; and one repair ship on order. Total cost of work on hand approximately $145,-000,000.

Staten Island Delivers

The Staten Island Yard of the Shipbuilding Division, Bethlehem Steel Company, Inc., on April 25 delivered their Hulls Nos. 8002 and 8003, the remaining two of three U. S. Navy fleet tugs. The three tugs were named after Indian tribes of the Southwest — Navajo, Seminole and Cherokee. These tugs have very powerful diesel-electric propulsion machinery with special control. Their cost, $1,226,000 per tug.

Bethlehem Fore River

The **Fore River Plant** delivered the airplane carrier Wasp, and report an order for three large tankers, Hulls Nos. 1485-1487, to be 502 feet long, 68 feet beam and 37 feet deep.

New Tugs

The **Levingston Shipbuilding Co.** of Orange, Texas, delivered an 80-foot all-welded steel towboat to **W. G. Coyle & Co.** of New Orleans during April, and received orders from the **Atlantic, Gulf and Pacific Company** of New York for two all-welded steel tugs, one 48 feet long with a 165-H.P. diesel, the other 57 feet long with a 240-H.P. diesel, both for delivery in May, 1940. Fast work!

During April they delivered also: two all-welded steel barges 173′ x 19′ x 8′ 6″ to the **Higman Towing Company,** Orange, Texas; four all-welded barges, same dimensions, to the **Pan American Refining Co.**; and one diesel-electric ferry to **Electric Ferries Inc.,** powered with a 950-H.P. General Motors diesel and a 750-H.P. propulsion motor.

One Tug and Two Ferries

Pusey and Jones Corporation report two new contracts.

First is Hull No. 1079, a steel tug of 215 gross tons for the **Long Island R. R. Co.** This hull will be: 105 feet by 24 feet by 12 feet 11 inches. Powered with a Una-Flow steam engine of 800 S.H.P., she will make 11 knots speed. Delivery is set for December, 1940.

The second contract is for two ferries, Hulls Nos. 1080 and 1081, for the **Delaware and New Jersey Ferry Co.** These will each be 206 feet x 65 feet x 16 feet, and will be powered with a 1,400-S.H.P. Una-Flow steam engine.

Sun Delivers

During April **Sun Shipbuilding and Dry Dock Company** delivered to the **Moore-McCormack Lines** the C-3 motorship Mormacland, third of a series of four cargo vessels of the Mormacpenn class. These ships are powered with four Busch Sulzer diesels connected to a single propeller shaft through Westinghouse electrical couplings and a Falk single-reduction gear set. They have a normal shaft horsepower of 8,500 and a sustained sea speed, fully loaded, of 16½ knots.

After this delivery, Sun had under construction or on order 36 vessels, aggregating over 320,000 gross tons.

Submarine Distress Signals

At the time of the disaster of the submarine Squalus, smoke bombs were observed by fishermen operating in the vicinity. It appears that these fishermen thought nothing of these displays, supposing that they were some form of drill, and made no report of them.

A submarine of the United States Navy which may be in need of assistance releases a *red* smoke bomb.

A submarine which may be compelled to surface in the vicinity of surface craft releases a *yellow* smoke bomb. Surface vessels should keep clear of the yellow smoke bombs.

Any person sighting a red smoke bomb rising from the surface of the water should report the time and location immediately to the neaerst Naval authority or Coast Guard unit.

Training For *Safety and Security at Sea*

By Rear Admiral R. R. Waesche

Commandant, U. S. Coast Guard

During the past year the Coast Guard has made great progress. New duties and new equipment have been entrusted to the service, particularly in the line of training the seagoing fraternity. Also, our personnel, both commissioned and enlisted, has been increased to meet our expanding responsibilities. Finally, last July the old Lighthouse Service was merged with the Coast Guard, in the interests of economy and efficiency in related spheres of action. This merger brought many ships and stations into the Coast Guard and nearly a 50 per cent increase in our personnel.

The men of the former lighthouse branch are changing their old uniforms and status for those of commissioned and warrant officers and enlisted men of a greater Coast Guard.

We were happy to welcome these men, with their long tradition of public service, into our corps. We are proud that they and their lights and buoys, which guide our merchant shipping, henceforth are joined with us in a truly national service for insuring safety at sea.

Maritime Training

Now, perhaps, something of the background of the Coast Guard's entry into maritime training would be of interest. About four years ago the Federal Government undertook a realistic approach to the whole shipping problem.

The report of its Maritime Commission in 1937 was an economic survey of the American Merchant Marine. This report, in masterly scientific fashion, established many facts essential to the formulation of any intelligent merchant marine policy. Further, it sketched the outlines of what such a policy might be.

Merchant Marine Survey

The Commission made two very important statements. First, that its single objective was the national welfare, and that shipping—at least, the subsidized portion—must be viewed as one means of insuring that welfare. Second (and I quote): "Upon the degree to which shipping fulfills this public-service function must rest its principal claim for Government support."

The public interest involved in shipping, many hold, is an obvious one in its twin aspects of service to American commerce and to American defense. Further, there is definite public welfare dependent on the Government's heavy investment in the merchant marine. A ship that meets disaster shows no operating profits on the voyage. Thus the public interest is bound up with safety at sea for economic, as well as for purely humanitarian reasons.

Finally, Congress' policy, as stated in the Merchant Marine Act of 1936, requires that the United States "shall have a merchant marine manned with a trained and efficient citizen personnel."

Majority Unschooled

But the Maritime Commission soon found that about 80 per cent of all merchant marine officers had received no systematic training and that only 10 per cent were graduates of state nautical schools. General training facilities for unlicensed men simply did not exist.

With the public welfare and the congressional mandate as guides, the Maritime Commission therefore, embarked on a national course of training American merchantmen. To the Coast Guard the program was entrusted.

In the Coast Guard we have found that no matter how well we educate our officers while cadets at our academy, it is necessary to provide for their continued education as long as they are on active duty. The profession moves ahead, and every officer has both to catch up and brush up constantly. I feel quite sure it is the same in the merchant service of today. The day of the seaman who has no more to learn is past. Consequently, our program of training both licensed and unlicensed personnel is aimed at providing them a continuing sort of education.

We give these men a stiff course and they seem to like it that way. In the Coast Guard we emphasize the swift progress of science and engineering at sea, but we believe first of all that seamen must be salty. Consequently, in planning the course for the Maritime Service we have tried to hit a happy balance between theory and practical work.

Practical Courses

Schedules both for licensed and unlicensed men of all ratings—deck, engineer or steward — give ample practice in seamanship, boatmanship and safety devices of all kinds. The course for licensed officers is divided into deck and engineer branches. In all, 23 professional subjects and 7 practical drills are open to officers.

Some of the subjects, of course, are elective, while others are required. Mathematics, navigation, maritime law, ship construction, electricity, history of disasters, safety precaution, steam machinery and other suitable studies are included in the list.

Extension Courses

But the Maritime Service is not the only direction from which the Coast Guard in 1940 approaches the problem of training for safety at sea. The correspondence courses of our institute have been made available

by the Maritime Commission to all merchant officers and seamen who can qualify as to sea service. They are also available to members of the cadet training system which the commission administers directly.

Further, a recent law enables the Coast Guard to lend officers to state school-ships. We have one on duty now on the California vessel.

Again, last year congress set up the Coast Guard Reserve, primarily an organization to promote safe navigation among yachtsmen and small boat men throughout the country. The year 1940, therefore, finds the Coast Guard involved, one way or another, in the full scope of maritime training.

Abstract of an address at the 36th annual dinner of alumni of the New York State Merchant Marine Academy, March 2, 1940.

An Unusual Wave

We have always been interested in heights of waves at sea. Stevenson, great British lighthouse engineer, made many measurements and opined that, "In the open sea the waves very seldom rose more than 12 feet above sea level."

The following, from the U. S. Hydrographic Bulletin, may therefore be taken as a description of a very unusual wave:

"Third Officer E. G. Babvard, of the American steamer Endicott, Capt. H. Johnson, reports that at 0020 ship's time, on January 28, 1940, in lat. 30°30′ N., lon. 172°50′ W., while on a passage from Long Beach, Calif., to Kobe, Japan, an unusual sea wave was encountered, which did considerable damage.

"A westerly gale was blowing at the time with high seas, when a 'wall of water' bearing down 'like a tidal wave' was observed ahead, towering about 30 feet above the bridge, which was 36 feet in height. The ship plunged into this wave, and was then raised up with it until the forward part of the vessel was out of water clear aft to the bridge. She then passed over the crest of the wave and, dipping down, lifted the stern clear out of water. As she plunged into the next wave, the previous one engulfed the poop, swept away the hand steering gear, together with the compass, and flooded the crew's quarters. However, no water was shipped amidships."

If the observations on height are correct, we have here a wave of which the vertical distance from trough to crest is 66 feet. Such waves would normally have a length from crest to crest of approximately 1,300 feet.

The Endicott is of 6,319 tons gross, 402.6 feet length, 54.8 feet beam and 32.1 feet depth. Fully loaded, she has a draft of about 26 feet. The fact that her bow plunged into the next wave as her poop was being engulfed by the big sea shows that the latter was not of regular wave form, and must have been caused by some coalescing of waves or collision of waves that piled the water up to double height. All of which proves only that "eternal vigilance is the price of safety" at sea, where the foundation of stability constantly through the centuries is at any moment so dangerously changeable.

Alien Charters Require Approval

On April 18 the United States Maritime Commission announced that all instances of chartering American-flag vessels to aliens without the approval of the Commission would promptly be reported to the Department of Justice in order that penal action may be instituted. Several such cases have recently been so referred to the Department of Justice.

Under Section 9 of the Shipping Act of 1916, any vessel wholly or partly owned by American citizens and documented under the laws of the United States so chartered without the Commission's approval is subject to forfeiture to the Government, and anyone chartering such a vessel to an alien without the Commission's approval is guilty of a misdemeanor and subject to a $5,000 fine and imprisonment for five years, or both.

The Commission explained that apparently some ship operators have been led to believe that it is not necessary to secure the Commission's approval of the charter of their American-flag vessels to aliens unless the transaction is in the form customarily referred to as a "charter." On the contrary, the Commission considers that the word "charter," as used in Section 9 of the Shipping Act, includes many agreements, the form of which is other than that usually utilized in chartering vessels, and shipowners entering into such agreements which are "charters" within the meaning of the Shipping Act are liable to forfeiture of the vessels involved and the penalties provided in Section 9 of that Act.

In this connection the Commission called attention to the decision of the Supreme Court in the Lake Monroe case, 250 U. S. 246.

PACIFIC
MARINE

Reviews

Diamond Jubilee Honored

In Fortune magazine for February, 1940, appears one of the outstanding announcements of the year—that of the Bridgeport Brass Company in announcing the celebration of Bridgeport Brass Company's 75 years of continuous activities in the brass and copper industry.

It seems only yesterday that Bridgeport was making brass strip for hoop skirts, brass sheet for oil lamps, or the first special copper wire for the first long-distance telephone lines between New York and Boston; it seems only yesterday Bridgeport was the first brass mill in the industry to adopt 100 per cent electrical furnaces for melting to secure finer and cleaner castings; it seems only yesterday that Bridgeport Ledrite brass rod revolutionized the screw-machine industry; phono electric wire, the electrical rapid transit on the San-Francisco-Oakland Bay bridge and Portland and Seattle's street railways, Duronze rods and tubes, and phono high strength wire making exciting history, and only yesterday that Admiral Evans sailed the U. S. battleship Oregon equipped with Bridgeport admiralty condenser tubes, by the old Union Iron Works, under forced draft from San Francisco to Cuba without cruise interruption to back up Admiral Sampson and the U. S. fleet at Santiago.

Bridgeport has a lot to show for its 75 years in the brass business. The newest and most modern in-line brass mill in the world, and some of the finest equipment the brass industry has ever produced.

That is important, of course, but it is no more important than the ex-

perience these 75 years of pioneering achievement has given Bridgeport—and today, on its seventy-fifth anniversary, Bridgeport turns to new tasks with greater confidence than ever before. New and finer manufacturing equipment have given the company a new absorbing opportunity, the opportunity to serve Bridgeport customers better than they have ever been served in the past.

Signalizing this Diamond Jubilee, Bridgeport Brass Company are also expanding their national warehouse services made necessary by the changing times, and, as at Los Angeles, their San Farncisco district warehouse have now completed the installation of modern condenser tube cutting, reaming and burring equipment to service the Pacific Coast marine trade from a comprehensive stock of Bridgeport Admiralty condenser tubes for immediate delivery and emergencies.

Announcement

John H. Hoffman has returned from New York to join the Pacific Coast organization of Foster Wheeler Corporation, and is renewing his wide acquaintance among the marine fraternity here.

In World War days, Mr. Hoffman supervised the installation of marine boiler equipment from Seattle to San Diego, and has since had a wide and varied experience, including development, installation and testing of the latest designs of high pressure marine steam generators.

Mr. Hoffman's headquarters will be in Foster Wheeler's San Francisco office.

Foster Wheeler Corporation will move to new offices at 206 Sansome Street, San Francisco, about May 1, according to announcement of Robert D. Spear, Pacific district manager.

McKenzie to United

W. H. McKenzie, inspector for the U. S. Maritime Commission, has been transferred from the Moore Dry Dock Company's yard in Oakland to the plant of the United Engineering Company, Ltd., in San Francisco, where he is looking after all machine and installation work in connection with the United firm's contracts for vessels building at Western Pipe and Steel.

As chronicled in a recent issue of *Pacific Marine Review*, Mr. McKenzie recently returned to the Coast from his former duties at the Sun yard in Chester.

JACK ARMES OF "GENERAL"

George A. Armes, president of General Engineering and Dry Dock Company, with plants in both San Francisco and Alameda, now has his son, **Jack A. Armes**, as executive assistant in the widely-known organization. Jack served apprenticeship through the various departments of General Engineering and his new duties will include a degree of supervision of the modernized and expanding company facilities in Alameda.

H. B. WEED BECOMES PYREN PACIFIC MANAGER

The Pyrene Manufacturing Company, manufacturers of fire extinguishers and tire chains, announces the resignation of **Major James P. Bradner**, manager of the Pacific Coast division for the past 17 years. He will be succeeded by **H. B. Weed**, a former Pacific Coast resident. Mr. Weed, who has been a member of the Pyrene organization for several years, will be located at the division offices, 977 Mission Street, San Francisco.

New Globe Service

On Monday, March 25th, Globe Wireless, Ltd., inaugurated its new Portland, Ore., telegraph office and modern short-wave sending and receiving radiotelegraph station. The new Globe office is a direct result of a recent petition filed by the Portland Chamber of Commerce with the Federal Communications Commission, protesting high rates charged for transpacific communications to Hawaii, Guam and the Philippines. Senator Charles L. McNary of Oregon took an active role in urging the F. C. C. to investigate the protested rates. For many years, Portland firms were obliged to pay higher tolls than Seattle, San Francisco and Los Angeles to these transpacific points. The Portland chamber's complaint charged that the rate differential placed a severe handicap on Portland's foreign trade in competition with other Pacific Coast ports.

On the heels of the chamber's petition for an investigation of these rates and practices, Globe Wireless made an application to the F. C. C. for authority to construct a complete radiotelegraph station and operate an office in Portland, offering the long-desired rates. Globe's application was subsequently granted.

PYRENE'S H. B. WEED

According to Jack Kaufman, executive vice-president of Globe Wireless in San Francisco, Globe is the first communication system to offer the rate parity to Portland users. The Globe Wireless System comprises a Pacific Coast owned international organization with offices and radiotelegraph stations located in New York, Chicago, San Francisco, Portland, Seattle, Los Angeles, Hollywood, Honolulu, Guam, Manila, and Shanghai, China. The new Portland Globe office offers telegrah service to foreign countries and to ships at sea providing a complete messenger pickup and delivery service.

A. S. RUPLEY OF GRACE

APPOINTMENTS

The Foster Wheeler Corporation, 165 Broadway, New York City, announces the appointment of **P. W. Foster, Jr.**, as manager of its steam division.

Martin Frisch, formerly chief engineer of the steam division, has been appointed chief engineer of Foster Wheeler Corporation.

New Grace Manager for San Francisco

Announcement of the appointment of **A. S. Rupley** as manager of W. R. Grace & Co., San Francisco, and its affiliated interests, was made recently by Adolf Garni, first vice-president of W. R. Grace & Co., New York.

Garni, who is here on an inspection tour of West Coast offices, said Rupley would assume his new duties immediately. He assumes the office which has been temporarily filled by **H. R. Kelley**, on the Pacific Coast. The latter returns to New York to rejoin the management there.

Edward T. Ford, Mr. Carni announced, who retired several months ago after years as vice-president of W. R. Grace & Co., in charge of their Pacific Coast activities, will continue as a director.

The position of Fred R. Doelker, as Pacific Coast manager of Grace Line, remains unchanged by the appointment of Mr. Rupley, according to Mr. Garni's announcement.

Mariners Club of California

News of the Month

Like the good old days, when the Mariners' Club of California (under the former Propeller Club designation) was holding regularly-scheduled program-meetings, a capacity audience turned out on Wednesday noon, May the first, to witness the special event which was presented.

"Capacity" is the word! We believe that the May attendance shattered all previous records for a luncheon - program. Present were men prominent in Coast ship operating, marine supply and allied fields.

The magnet attracting such enthusiastic response was the presentation by the Standard Oil Company of California of its "Building the West" story. The picture portrayed in an interesting and informative manner the part the petroleum industry has played in building the West.

In taking the picture, 33,000 miles were traveled and the audience was carried throughout the Pacific West, to Alaska and the Hawaiian Islands.

Among the interesting episodes were skiing on Mt. Hood, aquaplaning on Lake Mead, Columbia Glacier, and purse seining in Alaska, a tree topper at work, a trip through Bonneville Dam locks and surfboarding in Hawaii.

Chairman of the day was **Charles H. Robertson**, Marine Department of the Standard Oil Company, and it was good to see "Charlie" back at the helm wielding the gavel again—in the style familiar to all of us who recall the year he was our president.

Announcements to those present by the respective chairmen of activities included the heralding of the big golf tournament to be held in May down at beautiful Millbrae Golf Club. **Russ Pratt**, able chairman of the event, is making plots and plans, assisted by a hard-working group of Mariners—and Chairman Russ promises a gala day—on a superb course—with guaranteed sunny skies—prizes galore—and a grand time topped off by a banquet in the evening.

MARINERS AHOY!

Russ Pratt and his "aides-de-handicap" . . . Charlie Dilke, Art Donnelly, Jack Pruner and Tote Haviside . . . want all you turf-tossers and divot-diggers to come down to Millbrae Country Club on Thursday, May the 16th.

The big Golf Tournament—with a super banquet!! $2.50 sees you through. Phone Russ at HEmlock 4600 — or any of the boys on the committee.

A grand time ahead.
Come aboard!

Our advice—which, incidentally, we will take ourselves—is to book passage now! You can reach Russ Pratt at HEmlock 4600. Remember, if you're modest about your game and don't want to enter the competish—come on down with the caravan in the evening for the big dinner and all the entertainment that **Dick Glissman** and his aides-de-corps are stewing up! Always fun galore at these happy Mariners' affairs—and let's all come aboard on the 16th!

The tremendous interest manifested at the luncheon - program on May 1 has logically started plenty of members, officers and directors cogitating on more special events of similar nature—to augment the informal luncheons, where members drop in on the first and third Wednesdays of the month over at the St. Julien quarters at 140 Battery Street.

Right now it looks very much like we can look forward to another exceptional day at the Fairmont Hotel—probably during early June. However, these words are necessarily "unofficial," and due confirmation will reach all members through the usual channels—ahead of any specially-planned program.

CHARLES H. ROBERTSON

Another plan now under consideration is the observance of Memorial Day on the floor of the Marine Exchange in San Francisco . . . where In Memoriam honors will be attributed to men of the marine field.

President Walter Walsh and **Secretary Stanley Allen** can well be proud of the fruits of their labors, which, aided and abetted by loyal, earnest friends of the Club, have brought about a forward-moving, alert and revitalized maritime organization. More power to the Mariners' Club!

Meanwhile, the membership grows in quantity—and quality! Here are your new shipmates — as enrolled during April:

New Members

John C. Tiefel, Westinghouse Electric Co.

Clarence E. Adair, American-Hawaiian S.S. Co.

Eric Lyders, admiralty attorney.

V. J. Trout, Panama Pacific Line.

R. H. Jorgensen, General Engr. & Dry Dock Co.

W. B. Hill, Jr., C. C. Moore & Co.

Golf Tournament: To be held at Millbrae Golf Club, May, 1940.

Luncheon: May 1, 1940, to be held in Red Room, Fairmont Hotel. Program: Moving picture through courtesy of the Standard Oil Co.

News of the Propeller Clubs of the United States

The Port of San Francisco

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"Done at the City of Washington this 4th day of May, in the year of our Lord nineteen hundred and thirty-four, and of the independence of the United States of America the one hundred and fifty-eighth.

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By the President:
CORDELL HULL,
Secretary of State."

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meeting of the Propeller Club, Port of Los Angeles, and the Propeller Club, Port of the California Maritime Academy, was held aboard the vessel at Long Beach, Calif., with **Ralph J. Chandler,** president of the Propeller Club, Port of Los Angeles, presiding, assisted by **David Livingstone,** secretary, and **Capt. Robert Henderson,** U.S.N., retired, a member of the board of governors of the training ship. Following the luncheon, the speakers were **Capt. W. O. Read,** U.S.N.; **Ex-Governor Frank F. Merriam,** of California; **Francis H. Gentry,** mayor of Long Beach, and **Robert H. Fouke,** chairman of the board of governors of the Maritime Academy.

Under the leadership of Manuel J. Casseres, president of the Propeller Club, Port of San Juan, the "California State" was welcomed to Puerto Rico on February 26 by the board of governors of the club.

Elaborate arrangements for the reception and entertainment of the officers and cadets of the vessel were arranged by the Propeller Club, Port of Havana, Cuba, under the leadership of **F. R. MacMahon,** president of the port, prior to the arrival of the "California State" at Havana on March 4.

Arriving in Miami, Fla., on March 9, the vessel was welcomed by Alex M. Balfe, president of the Propeller Club, Port of Miami; Charles A. Albury, chairman of the board; Tony St. Phillips, Capt. L. S. LeCain, Ted Houser, and others associated with the port, who planned an elaborate program for the ship's three-day stay.

The arrival of the vessel at Newport News, Va., on March 17 was of special significance to the commanding officer, **Capt. N. E. Nichols,** who was welcomed by his brother, **J. F. Nichols,** chief engineer of the Newport News Shipbuilding and Dry Dock Company. Her arrival also marked a home-coming for **Richard Dwyer,** chief engineer of the ship, who for a number of years had been connected with the Newport News Shipbuilding and Dry Dock Company. General arrangements for the entertainment of the officers and cadets were under the direction of **J. B. Woodward, Jr.,** general manager of the Newport News Shipbuilding and Dry Dock Company and president of the Propeller Club, Port of Newport News.

On March 19, the U.S.S. "California State" arrived at Washington, D. C., where the officers of the Propeller Club, Port of Washington, D. C., under the leadership of **James J. Nolan** of the United States Lines, welcomed the visitors at a luncheon meeting at the Lafayette Hotel on March 21. Among the distinguished guests present on this occasion were the **Hon. S. O. Bland,** chairman of the Committee on Merchant Marine and Fisheries, and **Robert H. Fouke,** chairman of the board of the California Maritime Academy.

Prior to her return to the West Coast, the U.S.S. "California State" anchored off the naval academy at Annapolis, March 26 to 28, and was greeted and entertained by the officers and membership of the Propeller Club, Port of Annapolis, under the leadership of Lieut. P. W. Mothersill, U.S.N., president of the Propeller Club, Port of Annapolis. With naval academy midshipmen as guides, the cadets of the "California State" were conducted through the naval academy, and the vessel left at sunset on March 28 for her home on the West Coast, bearing with her the good wishes of her fellow officers and propeller club members on the East Coast for an early return and a bon voyage.

"Position Fix"

(Continued from Page 56)

high-speed aerial and surface navigation. Universal use of 'H. O. 214' will increase safety at sea and in the air and will make for more efficient navigation."

The amount of work necessary to prepare these tables is tremendous. Each volume of 10 degrees of latitude contains over 260 pages of tables and requires the computation of approximately 600,000 spherical angles. To maintain the necessary accuracy, which is to the nearest tenth of a minute of arc in altitude and the nearest tenth of a degree in azimuth, the preparation of each volume requires over 4,000,000 steps in computation and checking.

Approximately 250 WPA workers are employed on the project and are computing the tables, using formulae and procedures originated in the Research Division of the Hydrographic Office. These men are all former draftsmen, engineers, accountants, bookkeepers and clerks.

The Hydrographic Office has spent a number of years developing this system of navigation. A few years ago they released to navigators a volume of tables covering the ten degrees of latitude between 30 and 39 degrees. The limits of this volume included busy sections of the Atlantic and Pacific coastlines. Both seamen and aviators were requested to compare the accuracy and speed of working these tables with older methods. The immediate and enthusiastic response and the unanimous request for further volumes necessitated an extension of the series. It was not until the WPA was created, however, that sufficient man power and funds were available.

In conjunction with the tables of computed altitudes and azimuths, other work of maritime importance is being accomplished on this project. Since the beginning of the twentieth century, the Hydrographic Office has been receiving reports of current and ocean temperatures from mariners plying all-ocean routes. About one-fifth of the WPA personnel is engaged in averaging and analyzing these data; tabulating current and temperature statistics; and plotting charts for publication.

This work will materially aid in solving the existing problems relative to oceanic water circulation; climatic, meteorological and atmospheric conditions; the route and rate of drift of derelicts and wrecks; and the movement and disintegration of icebergs. As the results are being charted vagaries long suspected in the geographic position of current streams are being confirmed. All of this work is extremely important to scientists as well as to navigators. The accuracy of weather predictions, safety of both surface and aerial navigation, the fishing industry, oceanography and marine surveying are a few aspects affected.

The use of the "Tables of Computed Altitude and Azimuth" can be easily and quickly learned by anyone who is familiar with the principles of navigation. The tables are entered with arguments for the nearest whole degree of latitude, the nearest half degree of declination, and the nearest whole degree of local hour angle. With such entry the required altitude

and azimuth of the body is immediately obtained by inspection, with a small correction for declination by which the tabulated altitude is corrected for the necessary odd minutes of declination by mere inspection of a special multiplication table. The line of position is then plotted from an assumed position which is the latitude used in entering the tables, and the longitude used to obtain a whole degree of local hour angle. Additional means are provided for utilizing the D. R. position, or the D. R. longitude with an assumed latitude.

News of "The Bilge Club"

By William A. Mason
Lieut. Commander, U. S. Navy
(Retired)

The twelfth annual banquet of the Bilge Club was held in the banquet hall of the Los Angeles Biltmore Hotel on the evening of April 6.

Expressing the motif of "annual inspection," the invitations were worded in the technical language of the surveyor. Such terms as "plimsol mark" and "load line" were interspersed with exhortations as to care to be taken in loading of liquid cargo.

About 300 members and their guests were welcomed by President Dan Dobler who, after a few well-chosen words, turned the meeting over to Lloyd J. Moore, chairman of the entertainment committee, who had arranged a bill of amusement and entertainment which was pronounced by the oldest member as being better than ever before.

The banquet hall was decorated with the house flags of the various steamship lines serving this harbor, including those of the belligerent nations. A ship's gang plank served to provide entry into the hall and the bell from the old Lassco liner Yale was used by the chairman as a prelude to his remarks.

After the dinner and entertainment, the members and guests foregathered at the bar where old acquaintances were renewed and new ones made. The exact hour of breaking up was not divulged to your correspondent but it is believed that many of those present adjourned to the Bowl or to other places adjacent thereto until the wee small hours. It is even rumored that the light of dawn welcomed several of those who were still "up and doing" at that time.

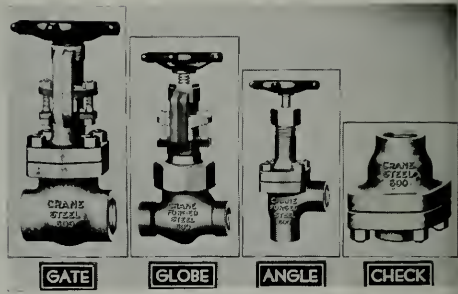
Capt. Edward Stuart, local inspector of hulls of the U. S. Bureau of Marine Inspection and Navigation, was welcomed at luncheon by the Bilge Club in its quarters at the California Yacht Club, Wilmington, on Tuesday, April 23.

Captain Stuart has lately been appointed to the local office, vice Captain Sullivan, deceased. He was transferred to this post from the Bureau of Marine Inspection office at San Francisco where he had been previously stationed for about two years.

Called to order by President Dan Dobler of the Texas Oil Company, the members and guests welcomed the newly-appointed inspector. Captain Stuart responded with a short address in which he expressed his appreciation of the rousing welcome which was accorded him. He assured the shipping fraternity that they might expect the fullest cooperation from his office.

Short speeches of welcome were made by "Billy" Wickersham, Albert Pegg, Harry Summers, Captain Peters, Capt. C. S. McDowell and Inspector of Boilers Joseph Moody. The latter gave a brief summary of the previous history of Captain Stuart and his many accomplishments, the latter being altogether too modest to touch on this subject.

New Line of Small Steel Valves For Steam and Oil



A new development in the field of small steel valves for steam and oil services is announced by Crane Co., Chicago.

Each type of valve was given individual attention from start to finish, which resulted in an entirely new line of valves, including the following:

(1) Gate valves made of cast steel with O. S. & Y. construction, having union bonnet type in screwed ends in sizes ¼- to ¾-inch inclusive; and bolted bonnet with screwed, socket weld, and flanged ends in sizes ½- to 2-inch inclusive (½-inch and ¾-inch are available in both union and bolted bonnet).

(2) Globe and angle valves made of forged steel in two types: Inside screw and O. S. & Y. construction. Inside screw valves have screwed ends with union bonnet in sizes ¼- to ¾-inch inclusive, and bolted bonnet in sizes 1- to 2-inch inclusive. O. S. & Y. valves have screwed ends with union bonnet in size ¼- to ¾-inch inclusive; and screwed, socket weld, and flanged ends with bolted bonnet in sizes ½- to 2-inch inclusive (½-inch and ¾-inch are available in both union and bolted bonnet).

(3) Check valves are also made in two types. The horizontal pattern is forged steel with union cap and screwed ends in sizes ¼- to ¾-inch inclusive; and with bolted cap and screwed, socket weld, and flanged ends in sizes ½- to 2-inch inclusive (½-inch and ¾-inch are available in both union and bolted cap). The vertical ball pattern is cast steel with bolted joint and screwed ends in sizes ½- to 2-inch inclusive.

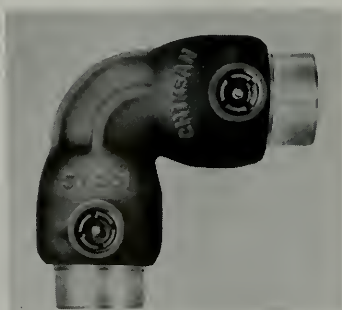
It will be noted from the accompanying illustrations that these valves are unusually compact and rugged. Some are forged; some are cast. The forged valve bodies are hammered out of billets made to conform to the requirements of A. S. T. M. Specification A-105, Class II, and are bored and threaded on new machines especially built for the purpose.

The castings for the gate valves and the vertical ball pattern check valves are an innovation in steel foundry practice in the valve and fitting industry. Carefully compounded from selected raw materials, this steel is melted by high-frequency induction methods with exacting control of composition and temperature. The result is radio-cast steel, so called because of the development and control of foundry technique and periodic x-ray and gamma ray radiographic inspection of castings.

The versatility of casting methods permits the designer to embody ideal principles without limitations, and results in valve design without compromise in desirable features. Due to the inherent stiffness of castings, alignment and tolerances between parts are more readily maintained under actual service conditions. As a result of the application of these advanced methods, Crane radio-cast steel easily complies with A. S. T. M. Specification A-216, the latest and most rigid specification covering high-grade carbon steels.

There are 176 valves in this new line. Each unit has been treated as an individual case study, with the result that every valve is designed and built to render a particular service with a liberal factor of safety, a minimum of maintenance cost and an assurance of reliability.

High-Temperature Swing Joints



The new Chiksan High Temperature Swing Joint is designed for operation at working pressures to 500 pounds, at temperatures up to 700 degrees F. Care has been taken to provide for unobstructed flow through all bends. Increased diameters are provided at the elbows to assure maximum flow with minimum pressure drop.

There are no packing glands or stuffing boxes to repack, no nuts and bolts to keep tight. This joint does not depend for its rigidity on bolted flanges, threaded parts, locking rings or keys of any type. All pressure or load is transmitted through double rows of hardened steel balls in flame-hardened races. The pressure or load required to force the members of this joint apart would have to be equal to the shearing strength of the metal. Since the shearing strength of the metal is greatly in excess of the rated capacity of the joint, a wide margin of safety is provided.

To provide a smooth, long-wearing surface, the packing chamber is machined to close tolerances and then chromium-plated and polished.

(Page 72, please)

The packing set is a specially-designed combination of asbestos and brass rings, and is held in place by the tension of a special alloy wire spring which retains its resiliency under high temperatures, also efficient at lower temperatures. The packing is not affected by chemicals injurious to rubber or synthetic compounds.

The new Chiksan High Temperature Swing Joint is made in six different styles for full 360 degree rotation in one, two and three planes. These styles are recommended for applications handling steam or chemicals where temperatures do not exceed 700 degree F. or a working pressure of 500 pounds. They are manufactured and distributed by the Chikson Tool Co., Brea, Calif. Style illustrated is No. 60, for applications where rotation in two planes is required.

A Streamlined Industrial Tractor

The new "Clarkat" industrial tractor, streamlined in harmony with modern design trends, and steel turreted to afford complete driver protection, is offered for the rapid and economical transfer of ocean cargo.

Capable of pulling 25 tons on trailers, the machine is so compact in design as to thread crowded aisles easily, pass through narrow doorways, operate on congested platforms. Twin wheels at the bow provide perfect stability, assist the tractor in negotiating rough roadways. The driver sits comfortably and safely within a heavy ½-inch steel body, and has clear vision of his load and of his right-of-way.

Power is provided by a Continental Red Seal motor, making the tractor capable of 24-hour continuous operation. Four-gallon gas tank is ample capacity for average day's consumption. The machine has an overall width of 38¼ inches, 57-inch turning radius, speed of 8 m.p.h. Equipment includes self-starter, hydraulic brakes in rear drive wheels, air cushion tires in rear (solid in front), universal coupler operated by driver without dismounting, and all-safety features to meet underwriters' inspection departments.

Clark Tructractor Division of Clark Equipment Co. also announce a heavier model for use on damp and slippery factory floors and steel ramps, and for pushing extra-heavy objects into position. It pulls 40 tons on trailers.

The "Clarkat"

Forerunners of Modern Power Age

Three ancestors of the modern alternating current electric system, which has made possible the present-day age of power, drew national attention at the United States Patent Law Sesquicentennial exhibit in Washington's Commerce Department Auditorium.

Included among the basic patents assembled by 100 leading industrial companies for the observance of the one hundred and fiftieth anniversary of the signing of the first patent act are the original Gaulard and Gibbs transformer, the first induction motor and the first induction meter. These venerable devices of electric power transmission, application and measurement were the forerunners of the modern developments produced by the Westinghouse Electric and Manufacturing Company.

Long since retired from active work, these seemingly-crude structures of wire and gears and iron are representative of the first practical achievements in the transmission and application of alternating current power over long distances from a central generating station.

The Gaulard and Gibbs transformer, no larger than a soap box, was utilized by George Westinghouse as an important tool in developing the alternating current system in America. It formed the basis on which successive generations of engineers and inventors have developed the modern transformers—some as large as a small cottage—which make feasible the generation of electric power at comparatively low voltage by stepping up the voltage at the transmitting end of the line and permitting power to be delivered economically over a great distance. At its destination, the power is then stepped down by means of iron cores and copper coils in similar transformers, from which it is delivered at usable pressures or voltages to homes and factories.

Development of the Tesla motor marked one of the greatest advances ever made in the use of electric power for industrial purposes. It is a classic example of the joining of theory and application. The principles of the rotating magnetic field were discovered independently by Nikola Tesla and Galileo Ferraris about the same time, shortly before 1888. Ferraris mathematically demonstrated the possibility of a rotating field by use of alternating current, but it was Tesla who built an experimental model of an induction motor which actually worked. Basic patents for it were granted to Tesla in the United States on May 1, 1888.

The same year an accident hastened the invention of the induction meter. Oliver B. Shallenberger, an electrical engineer, saw a small spiral spring fall into the mechanism of an arc lamp which was being adjusted. The spring landed on the disks at the end of the main magnet of the lamp and began to rotate slowly. Shallenberger reasoned that the rotating was caused by magnetic or electrical action, and told a col-

league, "I will make a meter out of this." Within a month he had invented the ampere-hour meter.

In the original meter, represented at the patent exhibit, a fixed primary coil in series with the power line induces currents in a stationary short-circuited secondary and a disk-moving element to produce continuous rotation. The speed is controlled by an air-vane damper so that it is proportional to the flow of current, a dial indicating the ampere or watt-hours of power being used.

New Type of Copper Perfected

Announcement of the perfection of a new type of copper after a ten-year research and development program costing well into seven figures was made recently by Wylie Brown, president of the Phelps Dodge Copper Products Corporation.

The new copper, known as "PDCP," was created by research to meet the need of the electrical industry for a copper of superior characteristics. Greater conducting power, ductility, fatigue resistance and surface quality are the outstanding characteristics of this modernized metal designed for dependable performance under the present-day demand for high speeds and less space.

Made under a closely-guarded, patented process, the new copper, in addition to its superior characteristics, is free of the imperfections of ordinary copper, which, according to engineers, have been responsible for a large percentage of electrical failures.

The improved metal is made without melting from electrolytic cathode copper, which is plastically converted by tremendous pressure in a reducing atmosphere at elevated temperature into smooth, dense copper bar, rod, strip or other desired commercial shapes.

Basically of the oxygen-free type, it is the only solid copper in the world which is not melted subsequent to the electrolytic purification process. Hence the intrinsic purity of electrolytic cathode copper is not only retained but is greatly enhanced at the high temperature of the reducing gas used in the process.

Ductility far greater than ordinary copper permits sharper bends and easier forming and drawing. The metal is said to approach the malleability of gold. This property, combined with greater conducting power for electricity, has made the improved copper popular for use in a multitude of complicated electrical parts and devices.

A new manufacturing unit was constructed at the Bayway mills of the Phelps Dodge Copper Products Corporation for the exclusive production of this PDCP copper in various commercial shapes and sections.

Ferry Completes Long Sea Voyage

A long ocean voyage under her own power by an American ferryboat ended at New York on Tuesday, March 5, when the E. G. Diefenbach arrived from Orange, Texas, where it was built, to go into service of the Electric Ferries, Inc. This ferry is of all-welded steel construction, 185 feet 2½ inches long, 55 feet beam and 15 feet 6 inches deep. She is powered by a 12-cylinder General Motors two-cycle diesel engine rated 950 horsepower at 750 revolutions per minute. She cleared from the Texas shipyard on February 19 and averaged 11 miles per hour on the 2,100-mile voyage.

A specially-picked crew of 18 men, furnished by the Moran Towing & Transportation Company of New York, under Captain James A. Deal, brought the ferry through this long voyage. Captain Deal said he encountered little difficulty during the voyage, except for a storm off Mobile, Ala.

No additional preparation of superstructure had been made for the ocean voyage, but very little water was shipped, and the boat proved entirely seaworthy.

She was put in drydock soon after her arrival, and went into commission on Friday, March 8, for regular service.

The E. G. Diefenbach was designed by Eads Johnson, New York naval architect, and was built in the Arthur Levingston Shipbuilding Company yards at Orange, Texas.

The engine is direct-connected to a 600-kilowatt, direct-current d-c generator, which supplies energy to a 750-horsepower motor connected to the propeller through a reduction gear.

Building in American Yards

Direct Reports from Yards as of April 1, 1940.

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Keel for first ship laid January 19, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Manoa, Makua, Richmond, Knud Rasmussen, San Antonio, Silverguava, Mericos H. Whittier, Brookings, President Cleveland, Malama, Bahrein, Vitus Bering, Manulani, Roseville, Barges Bay Gull and Utility, W. S. Miller, San Diego, Elwyn C. Hale, City of Los Angeles, President Lincoln, Peter Lassen, President Wilson, Frank G. Drum, Diamond Head, Manukai.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

DRYDOCK AND ROUTINE REPAIRS:

Dredge A. Mackenzie, Grenanger, Brandanger, Inland Chief, Pleasantville, Hanley, Nicolaou Ourania, Charles R. McCormick.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S Maritime Commission.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 40-foot sloop.

One 55-foot ketch-rig yacht.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of 5th Avenue
Oakland, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Dredge San Pedro, Standard No. 1, Stanwood, Haviside Barge No. 2, Associates, Patrol Boat Alert, Dredge Pacific, Tug Arabs, Solano.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Canco, Cornelia, Manzinata, Boxer, 14 cannery boats, Alaska Pacific Packing Co. fleet, Norco.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION:

4750-bbl. steel oil barge for Standard Oil Co. of Calif.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Tyoyo Maru No. 7, Suruga Maru, El Capitan, G. P. Barge No. 3, Yachts Maria Dolores and Enchantress, Tug Vivo, Tisnaren, M. V. Tosari, W. H. Berg, Los Angeles, Vera, Naruto Maru.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939. Keel laid, No. Y044, April 1, 1940.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Savannah, Boise, McFarland, Kilty, Kennison, Rathburne, Dent, Waters, Talbot, Montgomery, Grebe, Medusa, Seal, S-27, S-28, Bagaduce, Trinity, YO-24.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″, SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195 launched September 15, 1939; No. 196 launched December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission LOA 492′ 0″, LBP 465′, breadth molded 69′ 6″, depth molded 42′ 6″. Keel laid, No. 197, February 5, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Capt. A. F. Lucas, Mt. Olympus, Montanan, Nordbo, Pennsylvanian, R. J. Hanna, Claremont, Bering, Alaska Standard, Purse Seiners Virginia II and Vittoria, Silverado, District of Columbia, Carmar, Manatawny, Minnesotan, Alabaman, Bahrein, Margaret Johnson, Brandanger, Eureka, Admiral Senn, Komoku, Lumbertown, American, Sutter, Mexican, Georgian, H. T. Harper, Pacific Ranger, Dakotan, W. S. Rheem, Klipfontein, Pineapple Barge No. 1, Lake Frances, Humaconna, Pennsylvania, Silver Willow.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

DRYDOCK AND ROUTINE REPAIRS:

Enterprise, New Mexico, Williamson, Ramsay.

SEATTLE-TACOMA SHIPBUILDING CORP.
1801-16th Ave., Southwest
Seattle, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. Keel laying dates, March 5, April 15, September 10 and October 10, 1940, and March 10, 1941. Launching dates September 1 and October 1, 1940, and March 1, April 1, and August 1, 1941. Delivery dates January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS

Tug Active, Oregon Express, Robert Luckenbach, Virginian, Latouche, Point San Pablo, Mount McKinley, Julia Luckenbach, Taranger, Yukon, Mary D., Olopana, Absaroka, Umatilla Reef Lightship No. 93, North King, Edward Luckenbach.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, purse seine fishing vessel 100' x 26'. Launched March 26, 1940.

Hull No. 142, purse seine fishing vessel 93' x 24'. Launching date April 15, 1940.

Hull No. 143, purse seine fishing vessel 94' x 25'. Keel laid April 1, 1940.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. Keel laying dates, February 5, February 19, July 1, November 10, 1940; and March 1, 1941. Launching dates, June 5, August 31, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Twenty coal barges 175' x 26' x 11' for Carnegie-Illinois Steel Co.

Three oil barges 240' x 50' x 12' for Campbell Transportation Co., Pittsburgh, Pa.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S Navy. Delivery dates August and October, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Delivery dates, June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hull No. 1460, CV7, Wasp, airplane carrier for U. S. Navy: 14,000 tons: delivered April. 1940.

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy.

Hull No. 1477, Express, cargo vessel for American Export Lines, Inc.; 450' B.P. x 66' x 42' 3"; 16½ knots speed, geared turbines and water tube boilers: 14,500 tons. Launched March 9, 1940.

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S. Navy.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450' B.P. x 66' x 42' 3"; 16½ knots geared turbines and water tube boilers; 14,500 tons.

Hulls Nos. 1485-1487, three tankers 502' x 68' x 37'; 21,000 tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4330, Esso Annapolis; and 4331, Esso Albany; two 16,300 dwt. ton tankers for Standard Oil Co. of N. J.: 18 knots speed. Launching dates, No. 4330, September 9, 1939; No. 4331, April 27, 1940.

Hulls Nos. 4337, Delbrasil; No. 4338, Delorleans; and No. 4339, Delargentino; three passenger and cargo ships for Mississippi Shipping Co. Launching dates, No. 4337, December 16, 1939; No. 4338, February 17, 1940. Delivery dates, No. 4337, June 1, 1940; No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4340, Victor H. Kelly, tanker for Union Oil Co. of Calif. Launched January 6, 1940; delivered March 8, 1940.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hull No. 8003, one U. S. Navy fleet tug. Launched November 10, 1939; delivery date April 25, 1940.

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417' 9", breadth 60' 0", depth 37' 5". Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. Contract delivery September 1, 1941; estimated delivery date October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100 x 25' x 12'; 805 H.P. Fairbanks-Morse engine. Delivery date May 1, 1940.

One wooden deck scow 118' x 36' x 10' for builder's account. Delivery date May, 1940.

Two steel tugs 90' x 23' x 10'; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery dates August and September, 1940.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170' Delivery date June, 1940.

Hull No. 167, sub-chaser PC-452, length 174', for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1572, one welded flush deck cargo box barge 130' x 30' x 7' 6" for stock; 250 gross tons.

Hulls Nos. 1626-1628, three welded steel coal barges 134' x 34' x 17' for stock; 2301 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1653-1656, four welded steel carfloats 330' x 40' x 11' for Long Island RR, Philadelphia, Pa.; 5212 gross tons.

Hull No. 1659, one welded steel oil barge 148' x 38' x 9' for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135' x 26' x 8' for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hulls Nos. 1675-1677, three welded covered cargo barges 175' x 26' x 11' for Mountain City Mill Co.: 1590 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135' x 27' x 11' 9" for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80' x 30' x 9' for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250' x 34' x 9' 1" for Pennsylvania R.R.; 5940 gross tons.

Hulls Nos. 1706-1711, six type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 2832 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135' x 27' x 11' 9" for Semet Solvay Company, 290 gross tons.

Hull No. 1716, one welded steel derrick boat hull 66' x 40' x 6' 6" for McLean Contracting Co., Baltimore, Md.; 163 gross tons.

Hull No. 1717, one welded steel derrick boat hull 100' x 36' x 7' for Anthony O'Boyle, Inc., N. Y. C.; 220 gross tons.

Hulls Nos. 1718-1724, seven welded steel gasoline barges 195' x 35' x 9' 6" for Campbell Transportation Co., Pittsburgh, Pa.; 3976 gross tons.

Hull No. 1725, one welded steel landing flat 175' x 26' x 6' for The Texas Co., N.Y.C.; 249 gross tons.

Hulls Nos. 1726-1735, ten type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; launched December 20, 1939; delivery date June, 1940.

Hull No. 36. Tautog (SS199); standard displacement 1475 tons: launched January 27, 1940: delivery date October, 1940.

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; launched March 27, 1940; delivery date December, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laid December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons.

Hull No. 42, Mackerel (SS204): standard displacement 800 tons: keel laid October 7, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 159, Comet; C-2 cargo vessel for U. S. Maritime Commission. Launched December 16, 1939: **delivered March 25, 1940.**

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Launched March 9, 1940.

Hulls Nos. 162, Sea Fox; 163. Frederick Lykes; 164. Doctor Lykes; 165, Almeria Lykes; 166 and 167; six C-3 cargo vessels for U. S. Maritime Commission. No. 166 keel laid March 4. 1940. **Launching dates,** No. 162, January 27, 1940: No. 163, February 24, 1940: **No. 164, April 6, 1940; No. 165, April 27, 1940. No. 162 delivered March 18, 1940.**

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172-176. five C-1 cargo vessels for U. S. Maritime Commission. Keel laid, No. 172, January 22, 1940.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J. Keels laid December 26, 1939.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

THE INGALLS SHIPBUILDING CORP.

Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. Delivery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 271, ferryboat for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.: 105' x 35' x 5'. **Completion date April 1, 1940.**

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147' x 35' x 7' 6". Estimated completion date, August 1, 1940.

Hulls Nos. 275-276, two oil barges, 93' x 36' x 10' 6", for Panama Canal, Washington, D. C. **Estimated completion date, May 11, 1940.**

Hull No. 277, derrick barge 80' x 38' x 6' for Doullut & Ewin, New Orleans, La. **Estimated completion date May 15, 1940.**

Hull No. 278, mooring barge 100' x 30' x 5' for Standard Oil Co. of Ind., Chicago, Ill. **Estimated completion date May 12, 1940.**

LEVINGSTON SHIPBUILDING CO.

Orange, Texas

NEW CONSTRUCTION:

One all welded towboat; LOA 80', beam OA 22' 7", depth 9' 6". Powered by 550 H.P. diesel. For W. G. Coyle & Co., New Orleans, La. **Delivery date April, 1940.**

Four all-welded unmanned barges 173' x 39' x 8' 6" for Pan American Refining Co. **Delivery date April, 1940.**

One steel single-screw diesel tugboat 70' x 19' x 8' for Pan American Refining Co.; 450 B.H.P. **Delivery date May, 1940.**

One electric ferry 185' 2½" x 55' x 15' 6" for Electric Ferries, Inc. Powered with 950-H.P. General Motors diesel with one 750-H.P. propelling motor. **Delivery date April, 1940.**

Two all-welded unmanned barges 173' x 39' x 8' 6", for Higman Towing Co., Orange, Texas. **Delivery date April, 1940.**

One all-welded steel tugboat 48' x 12' 3" x 6' 2" for Atlantic, Gulf & Pacific Company, N. Y.; 165 H.P. **Delivery date May, 1940.**

One all-welded steel tugboat 57' 7" x 14' x 7' 6" for Atlantic, Gulf & Pacific Co., N. Y.; 240 H.P. **Delivery date May, 1940.**

MANITOWOC SHIP BUILDING CO.

Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406' x 57' x 23.5'. Approximate dates, launching date, September 15, 1940; delivery date, January 4, 1941.

THE MARYLAND DRYDOCK CO.

Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:
China Arrow.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.

Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Launched August 31, 1939.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons: L.B.P. 525'. breadth molded 75', depth molded 39'. Keel laid, No. 372, February 5, 1940. Launching dates, No. 370, September 29, 1939: No. 371, January 26, 1940.

Hull No. 376, single screw cargo vessel for United States Maritime Commission; turbine propulsion: gross tonnage about 8000 tons; length 435', breadth 63', depth 40' 6". Launching date December 15, 1939; **delivered March 27, 1940.**

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid. No. 379, October 2, 1939; No. 380, November 13, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 9100 tons.

THE NEW YORK SHIPBUILDING CORPORATION

Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy. Launched May, 1939.

One seaplane tender for U. S. Navy; order placed December 27, 1937.

One destroyer tender for U. S. Navy. Launched December 9, 1939.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

Two cruisers for U. S. Navy; order placed March, 1940.

THE PUSEY & JONES CORP.

Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp; 1600 gross tons; 300' x 65' x 20'; steam UnaFlow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. Delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413' x 60' x 37' 6"; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95' 6" x 24' x 14' 9"; steam Una-Flow propulsion; 600 H.P.; 13-knots speed: cost $200,000 each. Delivery dates July and August, 1940, respectively.

Hull No. 1079, tug for Long Island R.R. Co.; 105' x 24' x 12' 11"; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. Delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY

Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 184-185, two single-screw diesel cargo vessels for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery dates April and May, 1940.**

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates April, May, June and July, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery date, June, 1940.

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Sea-

train Lines, Inc. **Delivery dates May 15** and June 25, 1940.

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date December, 1940.

Hull No. 194, one tanker for Atlantic Refining Co.: 19,400 tons. Delivery date July 10, 1940.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.: 1,800 tons. Delivery dates October 1 and December 1, 1940.

Hull No. 196, one tanker for Lima Oil Co.; 1,800 tons. Delivery date November 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date March 15, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered. Launching dates, No. 33, October 31, 1939; No. 34, January 10, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons.

Literature of the Industry

A Million Miles of Diesel Satisfaction. Form 5856. Seventy-eight diesel-powered machines that have operated a total of more than 1,000,000 hours to date are photographed and described in a 32-page book just released by Caterpillar Tractor Co.

Farm and industrial tractors, road machines and industrial engines are included in the record-making list. Mentioned also is the early "Caterpillar" diesel tractor, which set a world mark for plowing performance and economy in 1932. The tractor is still in operation on an Oregon farm, after having run more than 24,000 hours.

None of the machines described are hand-picked. Performance records are direct from owners, and, where they are available, maintenance figures have been given. Units from all parts of the world are included.

Copies of the book may be obtained, free of charge, by writing Caterpillar Tractor Co., Peoria, Illinois.

Two-Stage Centrifugal Pumps, Bulletin 5972, published by Fairbanks, Morse & Co., describes a line of two-stage, split-case pumps with capacities up to 550 g.p.m. at heads ranging up to 600 T.D.H. These units are suited to all classes of general pumping service where the liquid is of low viscosity and free from foreign matter; they are used for such services as: water supply to high buildings or to small municipalities; transfer of liquids in industrial and process plants; boiler feed water; and power for hydraulic elevators.

Numerous features contribute to operating efficiency and long service life. Among these are: one-piece impellers made of material suitable for service requirements; proper hydraulic balance of impellers; hand-finished interior surfaces of impellers; removable wearing rings with streamlined water guiding surfaces on both casing and impeller; high manganese alloy steel shaft journaled in ball bearings of ample size to withstand all thrust and radial loads; and centrifugally-cast bronze shaft sleeves.

Horizontally-divided bronze glands facilitate removal and adjustment of packing. Stuffing boxes are especially deep to accommodate an adequate supply of packing rings. A bronze water seal ring for clear water in the stuffing box on the low-pressure stage prevents air from entering the pump chamber and reducing efficiency.

Centrifugal Blowers and Compressors, Catalog F of the De Laval Steam Turbine Company. A 52-page book, including chapters on the following subjects:

(1) The Construction and Characteristics of Centrifgual Blowers and Compressors.

(2) Turbine and Motor Drives.

(3) Governing.

(4) Properties of Gases and Laws of Compression.

(5) Selecting a Compressor and Calculating Power Required.

(6) Calculating Pressure Drop in Piping.

This book has many fine illustrations and diagrams, and is beautifully printed in brown and black.

Chronometric Hand Tachometer, a four-page bulletin issued by the Boulin Instrument Corporation and describing the latest Lyons Speed Indicator, which consists of an accurate chronometric movement, preset to measure an exact period of three seconds, combined with an accurate revolution counter. These two elements, housed in a Duralinox case, are automatically and positively synchronized for the duration of the measuring period. The instrument is supplied with several tips, and is used to measure either rotative speed in revolutions per minute, or surface speed in feet per minute, without changing scale.

All-Service Separators, a new 8-page bulletin, Publication 2950, published by Cochrane Corporation on baffle-type moisture and oil separators for use in vertical or horizontal steam, gas and air lines. The bulletin contains cross-section photographs and line drawings of the three popular types of line separators built for use on lines ranging from ½ to 30 inches in diameter. Complete design, dimension and constructional data are given, with list prices. Data on proper drainage, gage fittings and auxiliary equipment are also given.

Automatic Priming for Centrifugal Pumps, an automatic priming system for centrifugal pumps, which keeps the pump always filled with water and eliminates need for attention from operators, is described in a paper by F. S. Broadhurst, which has been reprinted and is being distributed by the De Laval Steam Turbine Co.

Special applications are described for individual pumps, a group of pumps using a common suction main, deep well pumps, sewage pumps and pumps on shipboard.

In all cases, with this system, the water level is maintained continuously at an elevation sufficiently above the impeller suction openings, so that the impeller is sealed against entry of air and will deliver as soon as it is brought up to speed.

An interlock prevents starting the pump until it has been properly primed, except in the case of pumps specially designed to permit running without water.

Compact Oil Pumps For Marine Power Plants

Nine of the new C-3 type, 8,500-gross ton, high-speed cargo vessels being built for the Maritime Commission, five by the Federal Shipbuilding & Dry Dock Co. at Kearny, N. J., and four by the Moore Dry Dock Co. at Oakland, Calif., and five C-1 6,400-gross ton cargo vessels being built by Federal for the Lykes Bros. Steamship Company, are being equipped with De Laval-IMO rotary displacement oil pumps for lubricating oil service, fuel oil transfer and fuel oil service to burners. Two of the new tankers being built by the Federal Shipbuilding & Dry Dock Company for the Socony-Vacuum Oil Company will also have pumps of this type. Similar pumps have been in service for some years on tankers, passenger ships and dredges.

The vertical units illustrated herewith are particularly suited for shipboard use, for by active cooperation of a ship designer and builder, this design has been developed to fit marine service from the operator's and shipbuilder's viewpoints. In addition to their ability to run at directly-connected motor speeds, and the complete absence of pilot gearing, these units have the following special features:

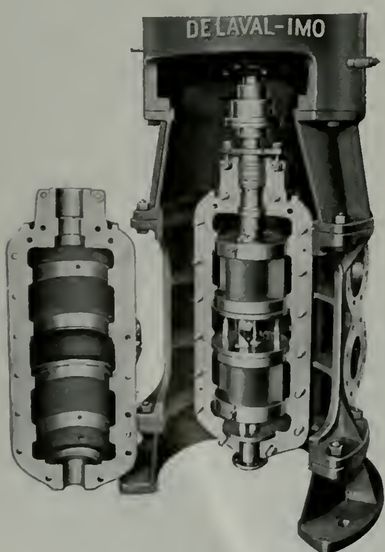
(1) Dual suction and discharge openings, so that connection to the piping can be made at either side of the unit.

(2) An easily-accessible strainer is incorporated in the suction manifold of the fuel oil transfer pumps and of the lubricating oil service pumps.

(3) Complete disassembly is possible without disturbing the motor or piping in any way.

(4) An exceptionally rugged mounting construction is provided, but at the same time only a relatively small floor space is required. For example, a 350 g.p.m. lubricating oil service pump requires less than the area of a 30-in. diameter circle of floor space.

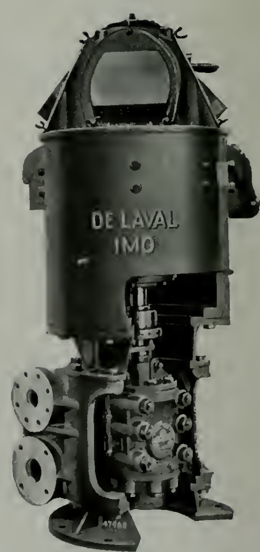
(5) No valves or reciprocating parts are used, and the discharge from the pump is extremely smooth and without pulsation, a particularly advantageous feature in fuel oil burner service.



Upper right:
Motor-driven unit for lubricating oil service and fuel oil transfer.

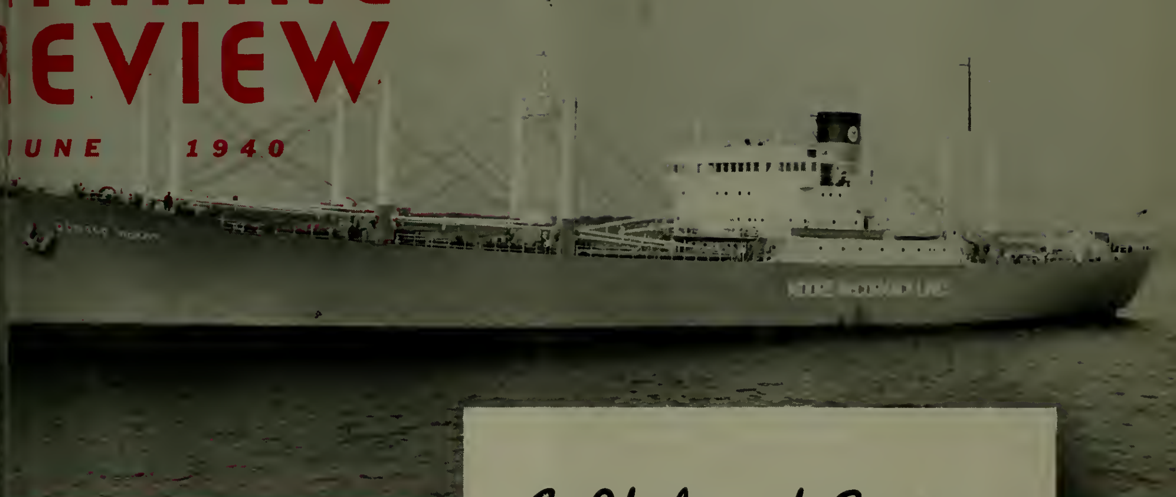
Lower right:
Motor-driven unit for fuel oil service to burners.

Left:
Lubricating oil service or fuel oil transfer pump with pump case cover removed, showing hydraulically-balanced IMO rotors and rotor housings ready for disassembly.



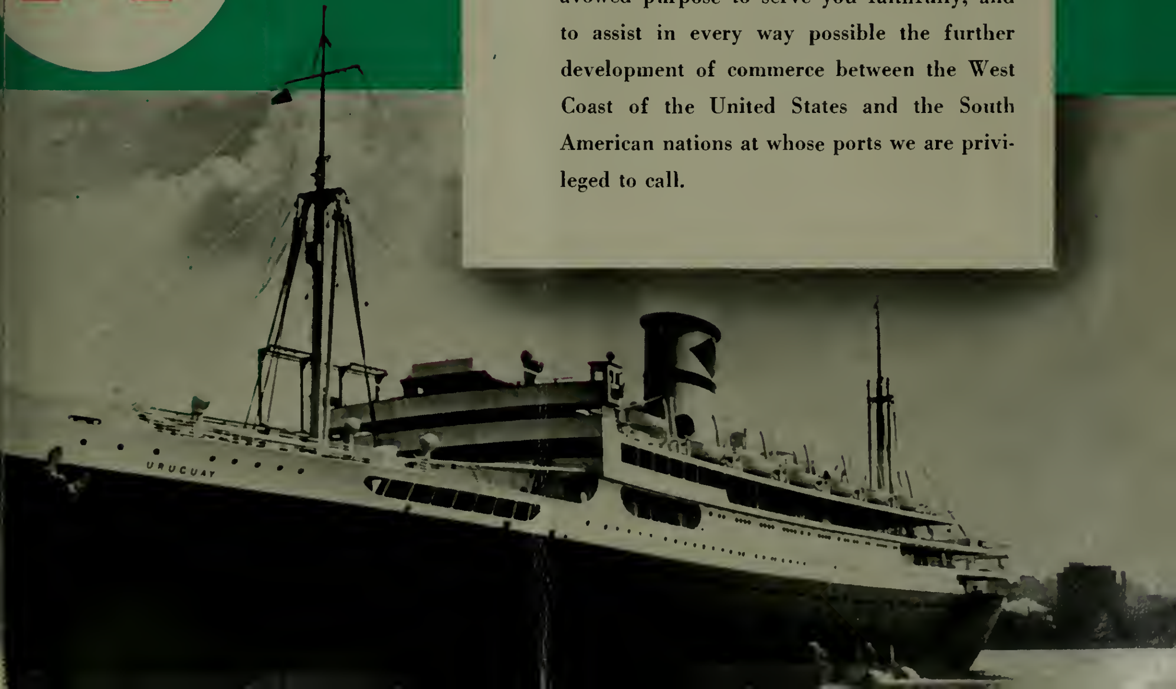
PACIFIC MARINE REVIEW

JUNE 1940



A Pledge of Service:

MOORE - McCORMACK LINES gratefully acknowledge the warm and cordial welcome extended to them by the entire Pacific Coast. It is our sincere hope and avowed purpose to serve you faithfully, and to assist in every way possible the further development of commerce between the West Coast of the United States and the South American nations at whose ports we are privileged to call.



Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

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No. 6

JUNE
1940

Admiral Land At San Francisco

"I was born in Nebraska, raised a cowhand and appointed to Annapolis from that region. Now who in h— wants to say there is no Westerner on the Commission?" Introducing his speech thus, Rear Admiral Emory S. Land, chairman of the U. S. Maritime Commission, captured the interest of the large and enthusiastic group of San Francisco Bay region leaders gathered at luncheon to do him honor on May 22.

The occasion was National Maritime Day—the location, San Francisco's Commercial Club.

The admiral is a human dynamo, as those who tried to follow his one-day schedule in San Francisco will all testify. At 9 a.m. he met the press and skillfully answered or parried a barrage of questions.

From this conference he sped by auto to the San Francisco Works of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company. Here he inspected quite thoroughly the shipbuilding facilities and the progress of construction on the two C-1 hulls now well under way; thence, by the same conveyance, some twelve miles south to the shipbuilding plant of Western Pipe & Steel Company, where again the admiral led the group and thoroughly inspected shops, building ways and actual construction of the two vessels on the ways. Then back to San Francisco for an official welcome at the mayor's office, and so to lunch.

At lunch Admiral Land was full of pep, and his talk frequently brought bursts of applause as he dealt with his subject (the Merchant Marine program) in straightforward, shipshape fashion without drawing any punches, and yet in a fine spirit of cooperation.

From lunch, the party sped immediately to the Army transport docks at Fort Mason, where they boarded a bay steamer for an inspection of the San Francisco waterfront and a visit to The Moore Dry Dock plant on the Oakland Estuary.

Here, by a rare coincidence, the Maritime Commission new C-3 cargo carrier Sea Arrow was on the floating dock to have her propeller attached and to receive her final paint coat before her trial trip.

This enabled a full inspection of the hull inside and out. Everyone, including the admiral, was convinced that this yard had done a remarkable piece of shipbuilding work. The experts were all trying to remember when they had seen a "better finished hull."

After inspecting the three hulls under construction at Moore's, and their facilities and procedure for shipbuilding technique, the admiral was wafted over for a preview of the 1940 International Exposition at Treasure Island, and so back to Fort Mason at 6 p.m., then to dinner dansant at the Fairmont Hotel, where (so they tell) the admiral, after this hectic day, danced into the small hours of Thursday morning.

This visit by the chairman of the U. S. Maritime Commission has left an impression of confidence in the minds of ship operators and shipbuilders on the Pacific Coast. The evident intention is for stabilization of the maritime industries, under private ownership, with a continuous, well-planned replacement of obsolete ships, and an aggressive drive for new overseas markets.

The Pacific Coast

Albert V. Moore, President, Moore-McCormack Lines Inc.

Albert V. Moore, president of the Moore-McCormack Lines, Inc., and his assistant, Lieut. Comm. K. H. (Pat) Donavin, U.S.N.R., on their recent tour of the Pacific Coast ports, created a distinct impression that they are sincere apostles of good will and worthy representatives of the Good Neighbor Fleet policy, which has become synonymous with the name Moore-McCormack.

This was peculiarly evident at the great luncheon held in their honor by the Chamber of Commerce and the Foreign Trade Association of San Francisco on May 13.

In his remarks on that occasion, Mr. Moore outlined the plans of his firm for future conduct of the Pacific Coast-East Coast of South America service to make that service of the greatest possible benefit to commerce on this great trade route.

These plans include:

(1) The establishment of offices and agencies at Vancouver, Seattle, Portland, San Francisco and Los Angeles.

(2) The assumption by Comm. Donavin of the duties of Pacific Coast manager in addition to those of assistant to the president. This particula feature of these plans is of especia interest to Pacific Coast shippers because Pat Donavin is well and favorably known to so many of them.

(3) The formation of a preliminary schedule of monthly sailings, beginning with a southbound clearance from the Pacific Coast of the steamer

K. H. Donavin, Assistant to the President, Moore-McCormack Lines Inc.

Welcomes New Moore-McCormack Service

Moore-McCormack Lines motorship Donald McKay

City of Flint on June 20, and the northbound clearance from Buenos Aires of the steamer Collamer on June 17, followed by the steamer Independence Hall on July 2.

(4) The formation of an aggressive organization composed of men who know steamship operation and how to get business therefor; and

(5) The increase of the fleet servicing this line with new, modern, fast tonnage as promptly as business warrants.

In commenting on this program, Mr. Moore indicated his opinion that "the surface had not even been scratched" in trade between the United States and the South American Republics. Starting their Atlantic Coast, South American services about a year back with new tonnage, the Moore-McCormack Lines expected to operate two passenger and two cargo vessel sailings a month. Last month they had fourteen sailings.

Their future plans call for fortnightly service in the Pacific Coast-East Coast of South America trade. For this purpose they are ready to immediately swing into this service two of the Maritime Commission C-2 motorship cargo carriers of the Donald McKay type. These ships have a deadweight of 8,800 tons, six nice staterooms with private bath, giving a capacity for 12 passengers, and a sea speed of 17 knots. Confirming their ability to furnish tonnage, Mr. Moore described the fleet now operated by or under construction for his firm, which aggregates 31 vessels with a total deadweight capacity of 321,500 tons. For details of this fleet, see table herewith.

Mr. Moore stated that a preliminary survey of the territories involved indicated considerable demand for passenger service by tourists and businessmen. His firm was much interested in this possibility and, should the demand develop, will be ready to place passenger liners in this service comparable with those now in the Good Neighbor Fleet on the New York to East Coast of South America run.

The ships will be operated by Pacific Coast crews. Supplies and provisions, routine repairs and other operating purchases will be made at Pacific Coast ports. All Moore-McCormack offices "have complete autonomy." This new service will be a Pacific Coast steamship line.

"Fleets of ships, no matter how fine these ships may be, and organizations for selling the services of such ships, cannot alone produce a successful steamship service. There must be built up at each end of the line a friendly spirit of mutual respect and confidence between the operator and those who consign to him the care and transport of their cargoes.

"Moore-McCormack have been very fortunate in establishing such relations with their shippers on the Atlantic Coast and in South America. We need to build up similar relations on the Pacific Coast.

"If the Pacific Coast wants and will support a first-class service for cargo and passengers to the East Coast of South America, we are prepared to give such a service and to go more than half way in building up business for our patrons.

"Two factors are very important in building up this business, and should receive special attention by Pacific Coast trade associations and Pacific Coast bankers. These are:

"(1) The character of representatives sent by Pacific Coast businesses to represent them in South American dealings. Send the best men you have. Executives of your firms who know their own business and have some knowledge of the country to which they are going. Europe has been sending its finest to South America for over twenty years. There are rich harvests there for those who know (or have patience to learn) how to cultivate that field.

"(2) Establish fair credit arrangements. This is where the banker should come to the help of the businessman. You have very strong banks and banking combinations on the Pacific Coast and there would seem to be no valid reason why these institutions should not establish more generally direct credit facilities for Pacific Coast business in South America. This factor of credit is very important in the matter of obtaining cargoes both ways. No steamship operation can exist on equitable freight tariffs unless it is able to obtain cargoes in reasonable volume for both legs of the voyage. Our experience in South America indicates that such a condition is attainable on this route provided we can get and hold the confidence and the cooperation of Pacific Coast business and Pacific Coast industry.

"Our present plans call for the finest service possible in the finest ships afloat, all dependent on this cooperation."

These are the words of a man of shrewd common sense mixed with unusual vision. Mr. Moore knows South America, and he knows the United States. We are sure that he will win the confidence of Pacific Coast shippers and that the Pacific Coast-East Coast of South America service of the Moore-McCormack Lines Inc. will prove a successful expansion of the Moore-McCormack Lines and their business methods.

Pacific Coast exporters and importers should give this new line the fullest measure of cooperation, to which their efforts are entitled.

The Fleet of The Moore-McCormack Lines Inc. Operating and Under Construction as of May 7, 1940

Ships Under Operation:

Argentina Brazil Uruguay	De luxe passenger liners sailing fortnightly from New York for Barbados, Rio, Santos, Montevideo and Buenos Aires; returning fortnightly via Santos, Rio and Trinidad. Speed 19 knots, displacement 33,500, deadweight 20,000 tons.
Donald McKay Mormachawk Mormacgull Mormacdove Mormaclark Mormacwren Flying Fish Lightning	New C-2 cargo liners, speed 17 knots, deadweight 8,800 tons, except the last two, which are 9,500 tons. The first six carry 12 pasesngers in rooms all with bath.
Mormacpenn Mormacland Mormacyork Mormacmail Seafox	New C-3 cargo liners, speed 18 knots, deadweight 11,900, except the Seafox, which is 12,500 tons. All ships carry 12 passengers in rooms all with bath.
Mormacsul Mormacmar Mormacrio Mormacrey	Cargo vessels, speed 13 knots, deadweight 8,400 tons.
City of Flint Collamer Independence Hall	Chartered vessels of 8,000 tons deadweight for service in the Pacific Coast-East Coast of South America trade.

Total Deadweight of Existing Fleet .... 249,500 Tons

New Ships Under Construction:

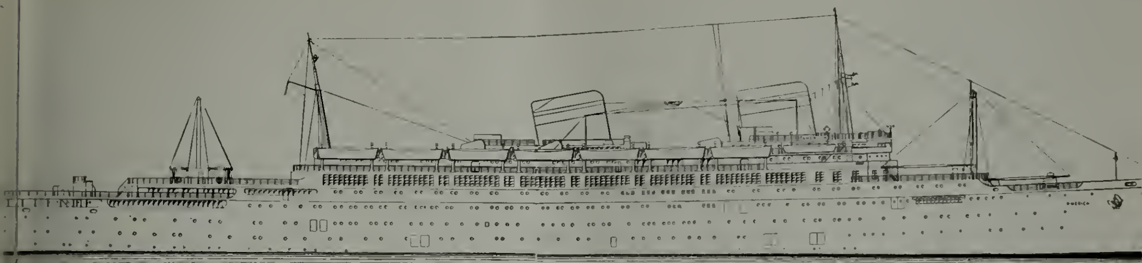
Four C-3 passenger ships as yet unnamed.

These 18-knot ships of 9,000 tons deadweight are building at the Sun Shipyard, and are expected to go into commision shortly after the first of next year. They will carry 200 first class passengers, all in rooms with private bath. 22 rooms will have private veranda, and 22 will be for single occupancy.

Four C-1-B cargo liners as yet unnamed.

These 14-knot ships of 9,000 tons deadweight are building at the Consolidated Shipbuilding Corporation, and are expected to go into commission at the end of this year or the beginning of next. They will carry 12 passengers in rooms all with bath.

Total Deadweight of Ships Under Construction .... 72,000 Tons
Total Deadweight of Entire Fleet .... 321,500 Tons



The United States

Passenger Liner America

By Harold F. Norton and John F. Nichols

Naval Architect and Chief Engineer, Newport News Shipbuilding and Dry Dock Company

The America was designed as the flagship for the United States Lines' fleet for a fast and efficient passenger and express cargo service with the Washington and Manhattan between New York and Hamburg, calling at Cobh, Plymouth, Southampton and Havre.

In developing her finally-approved lines some 5,000 test runs of models were made at the Newport News model tank and the Washington model basin. These included tests in artifically-created model tank waves corresponding to seas ranging from 100 to 1,000 feet in length, with movies of model motion in the seaway to permit careful study and analysis of the motions of the various models.

Best trace for bilge keels, best shape for bossings, and best propeller design, were all determined by large model tests at Washington. The result is a hull which its designers believe to be as hydrodynamically efficient as is possible. Speed and power curves for the final design are shown in the graph herewith.

In checking the longitudinal hull stresses, calculations were made for the main hull only, and also for the main hull with the deck erections

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America is now nearing completion at Newport News Shipbuilding and Dry Dock Company. Her sea trial is scheduled for June 15 and her delivery for June 28. The design as finally developed by Gibbs & Cox, Inc., naval architects of New York, and representatives of the United States Lines, owners of the vessel, was the culmination of a long series of designs prepared by Gibbs & Cox, and also, at the owners' request, by the Newport News Shipbuilding and Dry Dock Company.

This work started with "vague ideas of a modernized duplication of the Manhattan - Washington type, and ended with a vessel distinctly different in general arrangements."

On May 17 the Society of Naval Architects and Marine Engineers met at Newport News to inspect this great ship (the largest commercial vessel ever built in an American shipyard) and to discuss a paper prepared by the naval architect and the chief engineer of the shipyard, describing the design and the equipment of America. The present article is an abstract of this paper. Manufacturers' names in parenthesis are interpolations by the editor.—[Ed.]

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included in the girder. It is interesting that the inclusion of the erections in the hull girder system reduced the stress in the strength deck from 8.6 to 8.2 tons p.s.i.

Regulations and Classifications

America was built to highest classification of the American Bureau of Shipping, A-1-E, for North Atlantic passenger service. She meets, and in most cases exceeds, the approval of the U. S. Navy Department; the requirements of the Convention for Safety of Life at Sea; the rules of the U. S. Public Health Service; the regulations of the British Board of Trade; the standards of the Marine Fire Underwriters; the Rules and Regulations of the Bureau of Marine Inspection and Navigation; and the directions of Senate Report No. 184. That is, in respect to safety as to alarm systems and life-saving equipment, fire resistance, fire zoning, fire detection, fire fighting, floodability, and stability flooded, America embodies all recent ideas in their strictest form.

In many respects the arrangements go beyond the international regulations governing ships of other nations. In regard to floodability and stability flooded, all applicable regulations require only that the

ship be "two compartment." The America is "three compartment," both for flooding and stability flooded down to the lightest anticipated service conditions.

As will be noted from the illustrations, America has a distinctive profile, with a fine, lively sheer, curved raking stem, streamlined superstructure and funnels and graceful cruiser stern. These features combine to create an impression of beauty, power and speed.

Hull Structure

The general design and arrangement of the hull structure is shown on the midship section, inboard profile and arrangement plans herewith.

The promenade deck extends for a length of 513 feet 9 inches, and is the main strength deck to the hull for the midship portion of the vessel. It has on each side an athwartship overhang of 2 feet beyond the line of the hull immediately below. The tumblehome to the underside of the promenade deck is 3 feet 7½ inches. The sun deck is above the promenade deck, and has a length of 360 feet 8 inches. The sports deck is above the sun deck, and has a length of 343 feet 9 inches. As the stack is fitted with Vortex soot collectors, as well as a special Sampan top, it is expected that this deck will be kept quite clear of smoke and cinders.

Forward on the sports deck is the pilot house with the chart room, fire-control station and the radio rooms. The bridge front is so designed that the wind will be deflected up and over the head of the officer on watch. The forward stack, being a dummy, is utilized to house the emergency generator and battery room.

No expansion joints are fitted in the superstructure, the deck plating being increased in thickness as necessary to function as a part of the main hull girder system. The resulting stresses are considered to be conservative and within good practice limits for medium steel. No special steels are used in the vessel.

Longitudinal watertight intercostal side girders, 18 feet, 3 inches off the centerline, extend throughout the machinery space amidships. Longitudinal bulkheads forming the inner boundary of the deep wing fuel-oil tanks extend through the machinery spaces and are carried up to "B" deck.

All double-bottom tanks amidships are for fuel oil or oily ballast. The placing of all fuel oil amidships increases the speed of provisioning the ship and minimizes the piping required. The peak tanks are piped for both fresh and salt water.

The ship is primarily of riveted construction; however, welding is used for foundations, kingposts, masts, pads and countless details of the kind. The bulkheads are of welded construction with riveted boundary bars.

The frame spacing amidships is 36 inches, decreasing forward by 1-inch gradations at 1/5 length from the forward perpendicular to 27 inches, and decreasing further at 1/15 length to 24 inches. Aft at 9/10 length from the forward perpendicular the spacing decreases to 24 inches by 2-inch gradations. The side framing consists of channels, in general, 10 inches deep up to "C" deck and 8 inches deep to the promenade deck. The frames are joggled throughout, no liners being fitted. Web frames in conjunction with stringers are fitted in No. 1 and No. 2 holds, due to the long span. Deep web frames are fitted in way of the bossing to minimize vibration.

Channels are used, in general, for beams in the lower decks and bulb angles in the decks above. The slightly higher cost of bulb angles per pound is offset by the fact that the mills roll smaller bulbs, and thereby both weight and cost are reduced. Pillars over 15 inches in diameter are of welded plate construction octagonal in shape.

PRINCIPAL CHARACTERISTICS, S. S. AMERICA

Length overall	723 feet
Length on 32-foot 6-inch waterline	690 feet 3 inches
Length between perpendiculars	660 feet 6¾ inches
Beam molded, maximum	93 feet 3 inches
Beam molded at 32-foot 6-inch waterline	91 feet 11⅛ inches
Depth molded to sports deck at side amidships	92 feet 4⅞ inches
Depth molded to sun deck at side amidships	82 feet 4⅞ inches
Depth molded to promenade deck at side amidships	73 feet 4⅞ inches
Depth molded to upper deck at side amidships	64 feet 5⅛ inches
Depth molded to main deck at side amidships	55 feet 5½ inches
Depth molded to main deck at lowest point of sheer	55 feet
Height between main and "A" decks, frame 162	10 feet
Height between "A" and "B" decks, frame 162	9 feet
Height between "B" and "C" decks, frame 162	8 feet 6 inches
Height between "C" and "D" decks, frame 162	9 feet 6 inches
Load draft, molded	32 feet 6 inches
Load draft to bottom of keel	32 feet 8⅞ inches
Sheer forward at forward perpendicular	11 feet
Sheer aft at after perpendicular	2 feet 10 inches
Camber, upper deck and above, in 86 feet	3 inches
Camber on main deck and below	none
Displacement, full load, tons	35,440
Tons per inch immersion at 32-foot 6-inch molded draft	110
Deadweight, full load, tons, approximate	13,061
Gross tonnage, approximate	27,000
Net tonnage, approximate	15,000
Block coefficient at full load draft	0.5859
Maximum section coefficient at full load draft	0.9772
Prismatic coefficient at full load draft	0.5996
Waterplane coefficient	0.7147
Cargo, general, cubic feet, bale	about 265,000
Cargo, refrigerated, cubic feet, net	about 33,500
Ship's cold storage, cubic feet, net	about 34,350
Baggage space, cubic feet, net	about 19,650
Mail space, cubic feet, net	about 30,000
Shaft horsepower, normal	34,000
Shaft horsepower, maximum	37,400
Designed speed, in excess of	22 knots
Cruising radius, miles, at 22 knots at load draft, about	11,000
Cruising radius as above at 15 knots	18,000
Fuel capacity, 97 per cent full, tons at 37.1 cubic feet	4938
Tanks available for water ballast, tons	2238
Fresh water, tons, 100 per cent full	4733
Compartmentation, flooding and stability flooded	3 compartment
Metacentric height for 3-compartment flooding	about 4 feet
Cabin passengers	543
Tourist passengers	418
Third-class passengers	241
Total passengers	1202
Crew	643

Watertight Subdivision and Watertight Doors

The ship is fitted with 14 transverse watertight bulkheads. At the ends they extend to the main deck. In way of the machinery spaces they extend to "A" deck. Cofferdams are fitted over all deep fuel-oil and fresh-water tanks except the peaks. The shaft alleys are connected by passages for cross flooding. Due to the numerous power-operated watertight doors in the transverse bulkheads and to these cross passages, the crew can walk the entire length of each shaft alley on either side or cross over at three places, thus providing convenient access to any steady bearing. Compartments abreast of the shaft alleys, except tanks, are fitted with small doors to permit cross flooding and minimize any heeling moment due to underwater damage. The refrigerated spaces on "D" and "C" decks are fitted with similar flooding doors.

There are 59 watertight doors, all but two of which are power-operated from the bridge. The 57 power-operated doors are of the (Stone) horizontal sliding hydraulic type (furnished by the American Locomotive Company). To avoid a complete disablement due to the failure of a pipe, by collision or otherwise, two independent hydraulic systems are installed, each complete with accumulator tank and motor-driven hydraulic pump. Each system is arranged to operate the doors on alternate bulkheads. The accumulator tanks, which are normally half full of air and half full of liquid under 700 pounds pressure, have sufficient residual power to operate the system as required by the rules when the pump is inoperative. The pumps and tanks are installed in the machinery hatch, together with a storage tank and an air compressor for charging the tanks. In an emergency, doors on either system may be operated by the other system. All the doors are arranged to be closed at any time from a single control in the wheel house, or operated locally from either side of the bulkhead, and by extension shafting from above the bulkhead deck.

Principal Hull Castings and Anchor Gear

The stem has a cast-steel forefoot, fitted with an extension for paravane gear, and a rolled-plate upper section well rounded. The stern frame consists of five steel castings weighing a total of 41 tons. Two gudgeons are provided for the rudder. The spectacle frame is of the "clearwater" symmetrically streamlined type, and is composed of two steel castings bolted together through the center vertical keel. The trailing edge is well tapered and fined to a radius of one-eighth inch at the edge. The total weight of the spectacle frame castings is 65 tons.

There is a 26-inch inside diameter cast-steel bower hawse pipe of the outside bolster automatic stowing type, and weighing 7 tons, on each side of the bow. The design was developed in the usual way from a small-scale half model of the bow of the ship with hawse pipe, anchor and chain. The two (Baldt Stockless) bower anchors weigh 21,560 pounds each. The spare anchor (18,340 lbs.) is stowed under and handled by the 10-ton booms on the forward kingposts. The bower chains are each 165 fathoms of 3-inch wire diameter, Di-Lok, stud link. There is also a 16-inch diameter cast-steel towing pipe on each side at the bow.

The two bower windlasses are of the (Lidgerwood) direct geared type, each driven by a 100-horsepower electric motor. Each windlass is designed to raise its anchor and 30 fathoms of 3-inch chain at an average speed of five fathoms a minute. The wildcats are on the upper deck, and are driven through vertical shafts. The arrangement is such that either motor can drive either or both wildcats. The motors and gearing are located on the main deck, with the locking head and band brake for each wildcat mounted inside the bull gear housing.

At the stern there is an 18-inch diameter hawse pipe for the stern anchor, which is of the stockless type and weighs 7,805 pounds. The chain is 120 fathoms of 1⅝-inch wire diameter, Di-Lok, stud link, handled by an electrically-driven windlass of the (Lidgerwood) vertical direct-geared type at an average speed of five fathoms. The band brake and locking head are mounted on an extension of the wildcat hub below the main deck, and the motor and gears are located on "A" deck.

Rudder and Steering Gear

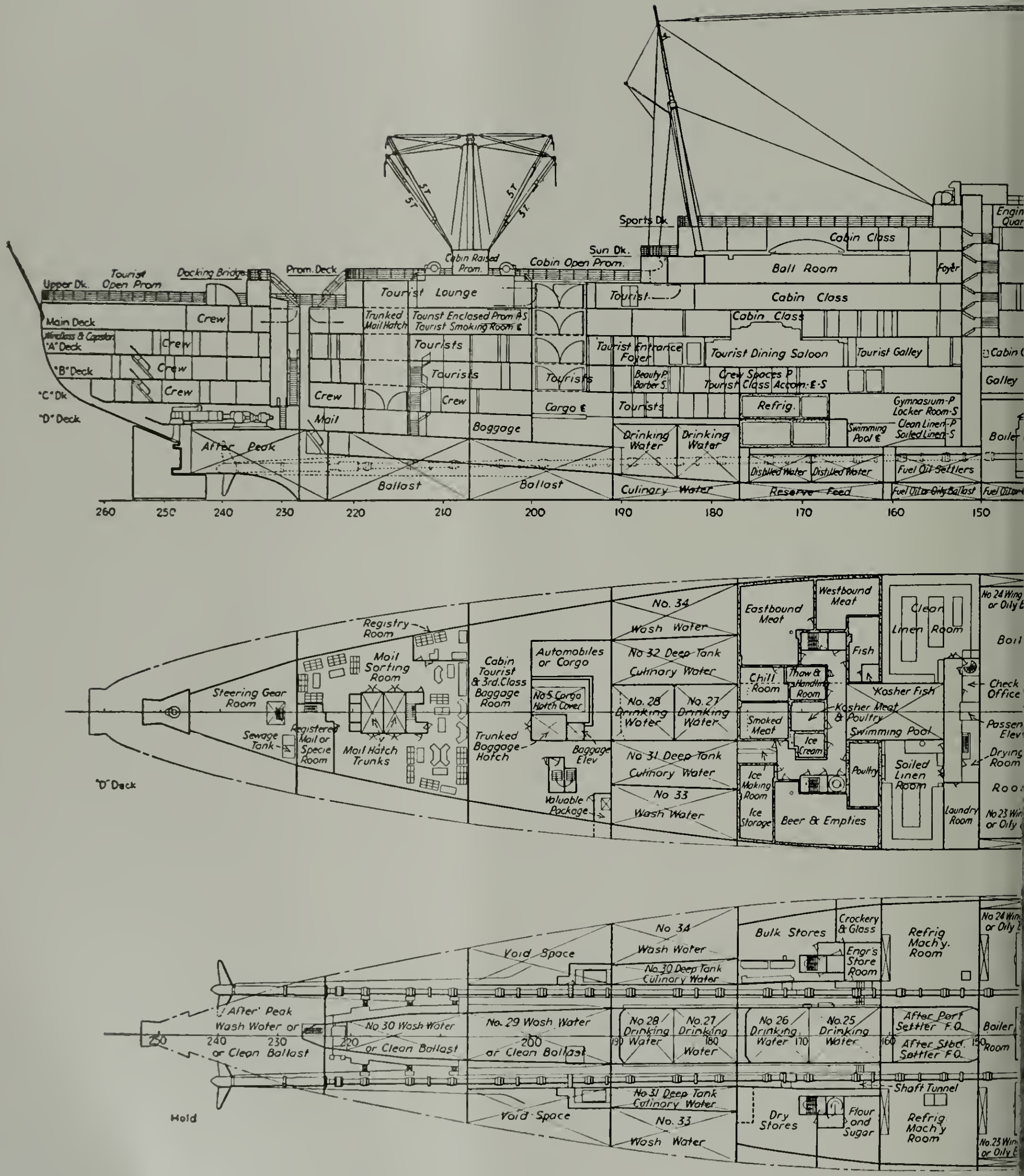
The rudder is of the semi-balanced, double-plate, streamlined airfoil design, made up of castings and structural steel and welded, with an area of about 425 sq. ft., a solid stock 24½-inch diameter, and a weight of 33 tons.

The main steering gear is of the hydro-electric type with two pairs of cylinders and two double 18-inch hollow rams located on "D" deck. Each pair of cylinders is self-contained on one bedplate. Each double end ram is connected to the rudder crosshead by double links. The steering gear is capable of operating the rudder from hard-over to hard-over in 30 seconds with the ship going ahead at 23.5 knots. The gear is served by duplicate power pumping units. The pumping unit is a variable-stroke pump controlled by a servo-motor and driven by a constant-speed motor through a flexible coupling and a helical reduction gear, all mounted on a common bedplate, which also serves as a storage tank for the hydraulic system. The gear is actuated selectively by a hydraulic telemotor or the gyropilot. The hydraulic telemotor is operated from steering stands in the wheelhouse and on top of the wheelhouse. Trick wheels are provided in the steering-gear room and on the after docking bridge.

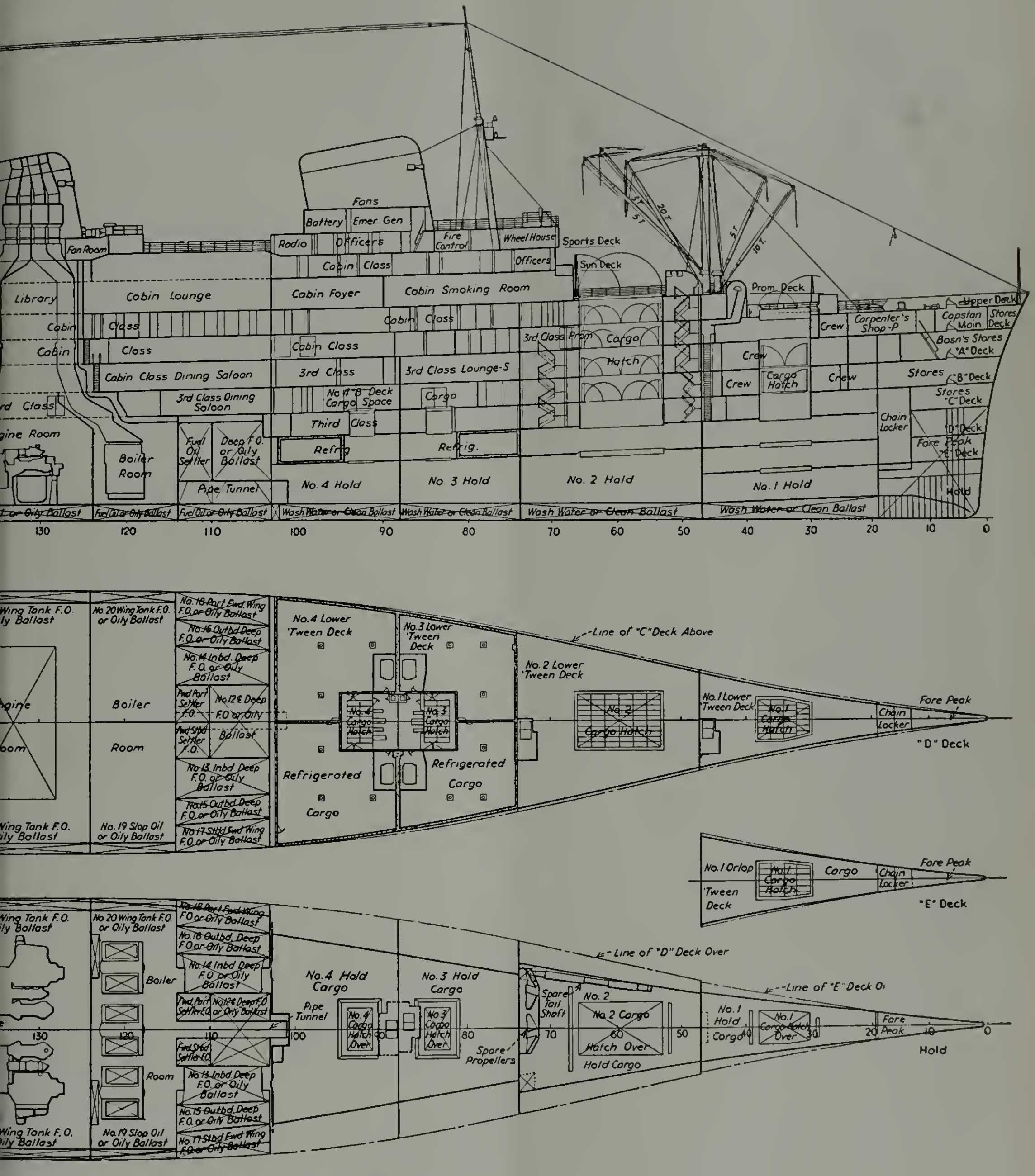
An auxiliary gear of the quadrant type is fitted. The quadrant, which is mounted directly above the main gear crosshead, is driven through a pinion and extension shafting by a motor and a worm reduction unit located on the main deck. To avoid the possibility of the rudder being hydraulically locked by the main gear, a by-pass valve operated from the auxiliary steering-gear room permits the flow of oil between the cylinders when the auxiliary steering gear is in use.

Mooring Bitts and Warping Gear

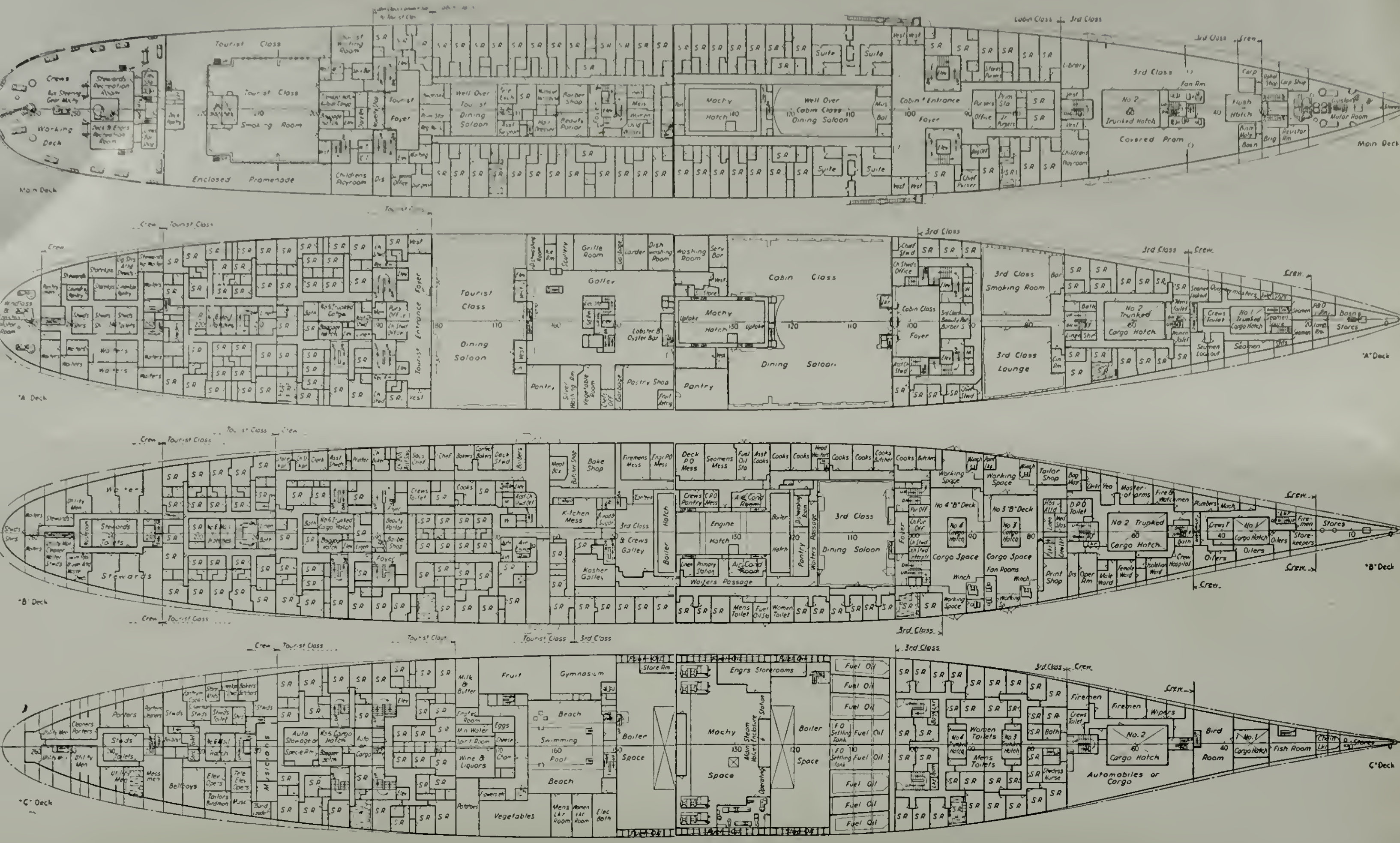
The America is provided with mooring and warping gear to the full requirements of the owners and also of the Panama Canal authorities. There are two (Lidgerwood) electric capstans and two 18-inch and six 16-inch cast steel bitts forward on the upper deck, with a riding bar and two vertical roller fairleads, so arranged that warping may be done



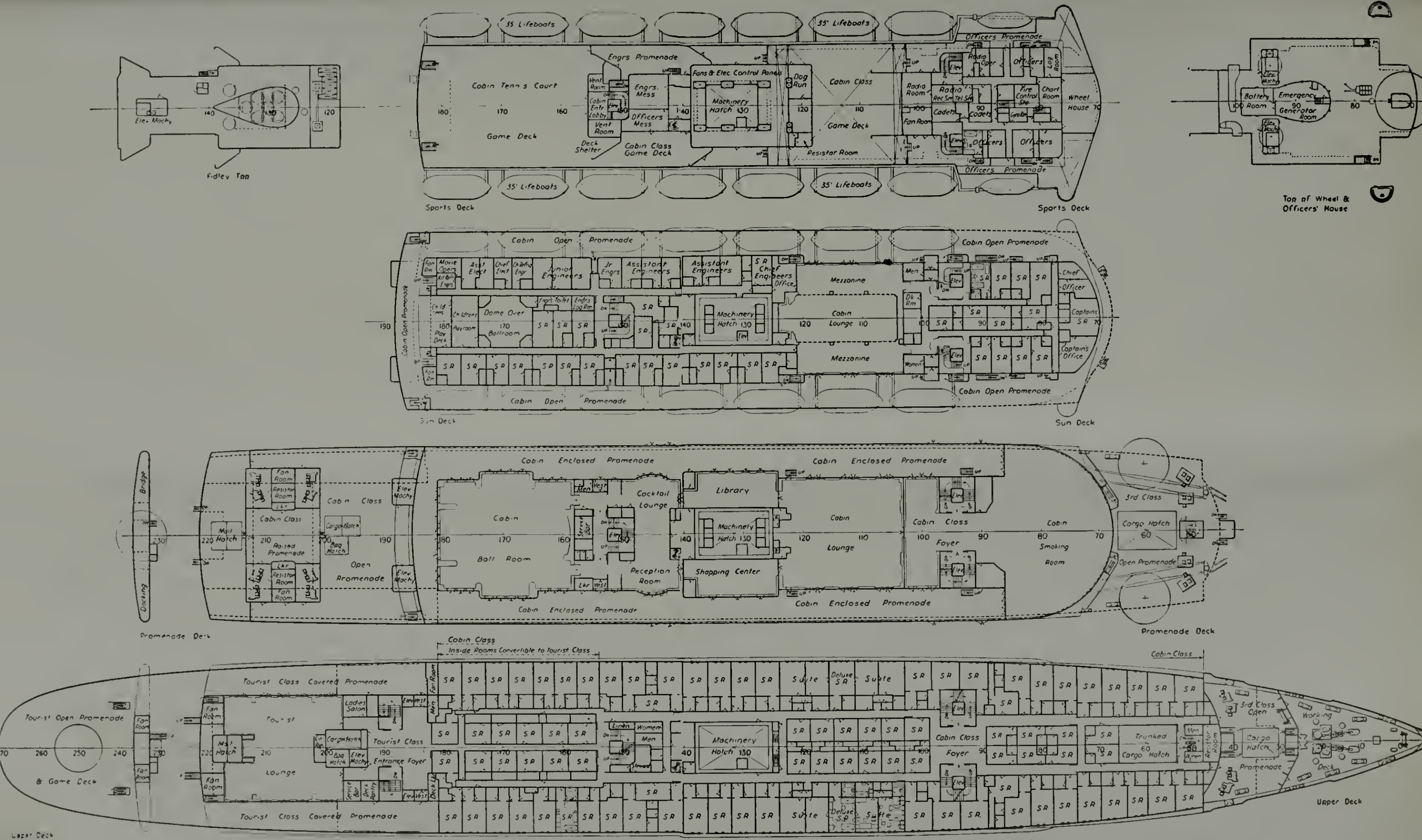
After half inboard profile and "D" deck and hold plans.



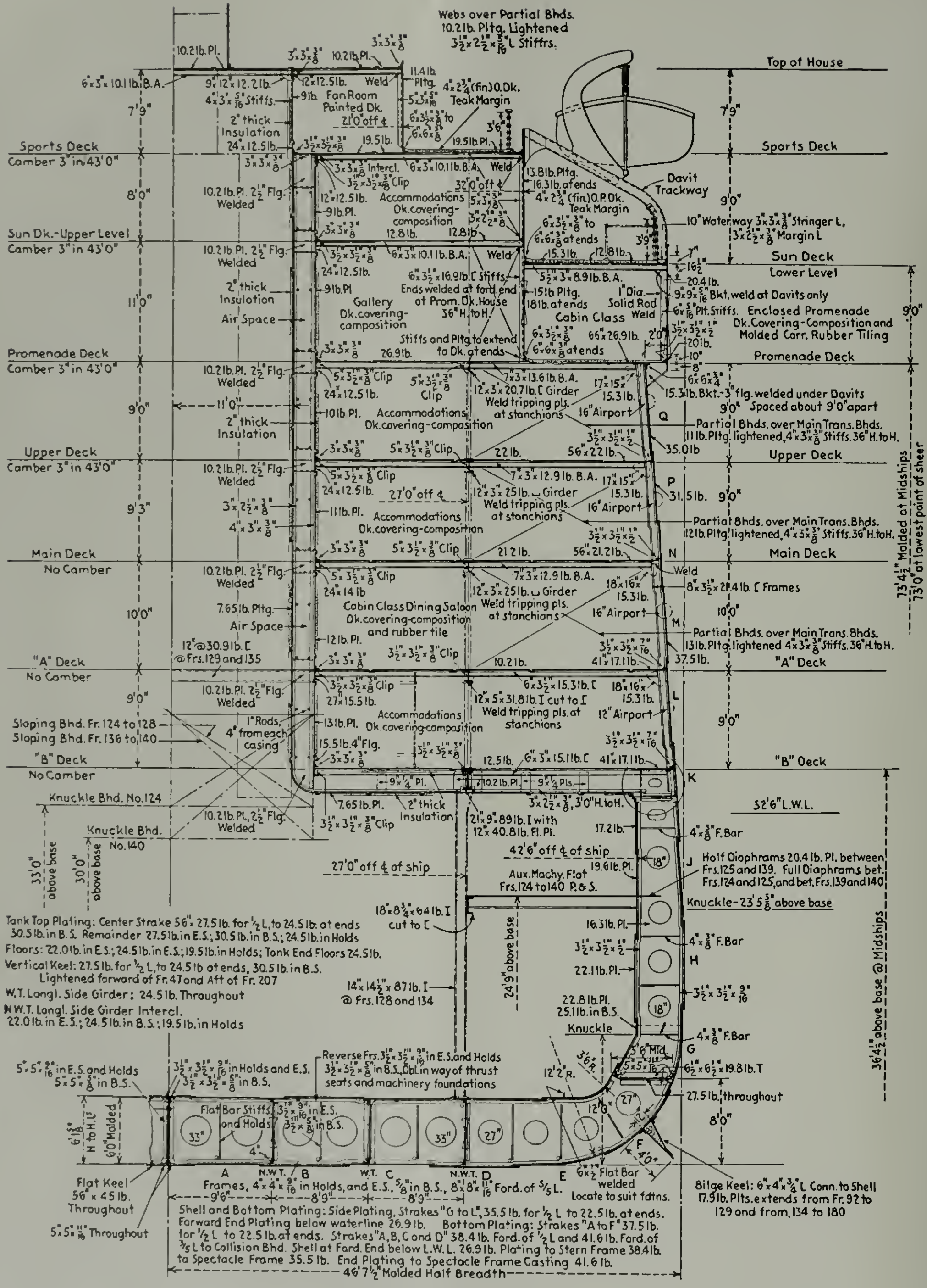
Forward half inboard profile and "D" deck and hold plans.



General arrangement plans, main, "A," "B" and "C" decks, America.



General arrangement plans, sports, sun, promenade and upper decks, America.



One-half midship section, S.S. America.

by either capstan on any line from any roller of any chock on either side forward of the breakwater. Aft there are three capstans and two 18-inch and eight 16-inch bitts. Just outside of the deck house on each side of the forward end of the promenade deck there is a 16-inch bitt and closed chock. The gypsy head on the 20-ton winches and the vertical roller fairleaders port and starboard are used for warping. The installation of chocks covers the Panama Canal requirements for an eight-locomotive ship. Stowed on reels about the ship are 270 fathoms of 10-inch and 270 fathoms of 9-inch circumference Manila rope, and 150 fathoms of 2½-inch diameter wire towline. Each capstan has a capacity of 25,000 pounds at a rope speed of 50 feet per minute.

Cargo Handling

There are 20 cargo winches, driven by 35-horsepower motors. Four of the winches are located below decks for serving cargo cranes and side ports. The remaining sixteen winches are on the weather deck for serving the cargo booms. All winches, except those at No. 2 hatch, where the 20-ton booms are located, are single-speed, single-drum, single-reduction with herringbone gears designed to lift 6,000 pounds with a single whip. The four winches at No. 2 hatch are double-drum, having a high-speed drum like those of the other winches, and a low-speed drum for handling the 20-ton booms.

Refrigerated Cargo and Ship's Cold Storage

The refrigerated cargo spaces forward on "D" deck are all air-cooled and arranged for temperatures as low as 10 degrees F. Each space is insulated with Johns-Manville incombustible BX-4 material between frames or beams and covered with ⅛-inch steel plating. Both the butts and seams of the plating land on and are welded to angle framing which is supported about 2 inches clear of the flanges of the beams and frames by 2-inch thick incombustible marine furring bolted to the angle framing and to the ship's beams and frames. The steel plate lining is aluminum painted on both sides. The deck construction is the same except that the plate is 3-16 inch thick covered with 1½-inch thick mastic deck covering, and the angle framing is supported on blocks of marine furring bolted to clips on the deck.

The ship's cold storage spaces on "C" and "D" decks aft are all brine-cooled, arranged for temperatures from minus 10 degrees to plus 45 degrees F., and are insulated and lined in the same way. The entire construction is incombustible.

Galleys and Pantries

A special kosher galley is completely equipped to comply with Jewish custom, is conveniently located to serve the crew and third-class passengers and is provided with a dumb waiter for serving tourist and cabin-class passengers. The cooking and baking equipment in all galleys is electrical of the most modern and elaborate type. All refrigerators are electric and fully equipped. The table tops, counters and sinks are of stainless steel. The deck covering is carborundum non-slip tile.

When stores are brought on board through the stowing ports on "B" deck at frame 163 they are sent down to the ship's refrigerated spaces on "C" and "D" decks, or the stores spaces in the hold, by a selective spiral chute at frame 166 starboard. These stores are brought to the butcher shop and galley and pantry spaces by the electric elevator on the port side at frame 166. This arrangement, concentrating all stores into one section of the ship with one principal means of access, enables the chief storekeeper to keep a more vigilant eye upon the stores.

Besides the galleys, there are the hot and cold pantries, service spaces, chef's office, yeoman's office, coffee pantries, cold food and fruit pantries, bread and sugar room, lobster and oyster bar, vegetable room, silver storage, grill rooms, larder, ice cream room, dish-washing rooms, glass and silver washing rooms and a scullery and garbage room. Electric dumb waiters provide service from the main galley and pantries to service pantries on each deck above for room service, service bars and deck service. Spacious and modernly-equipped and specially-designed decorative counter bars are provided in the smoking rooms of each class, and one in the cabin cocktail lounge. The America seems prepared in every possible way and with every imaginable facility to furnish patrons with the most delectable things to eat and drink.

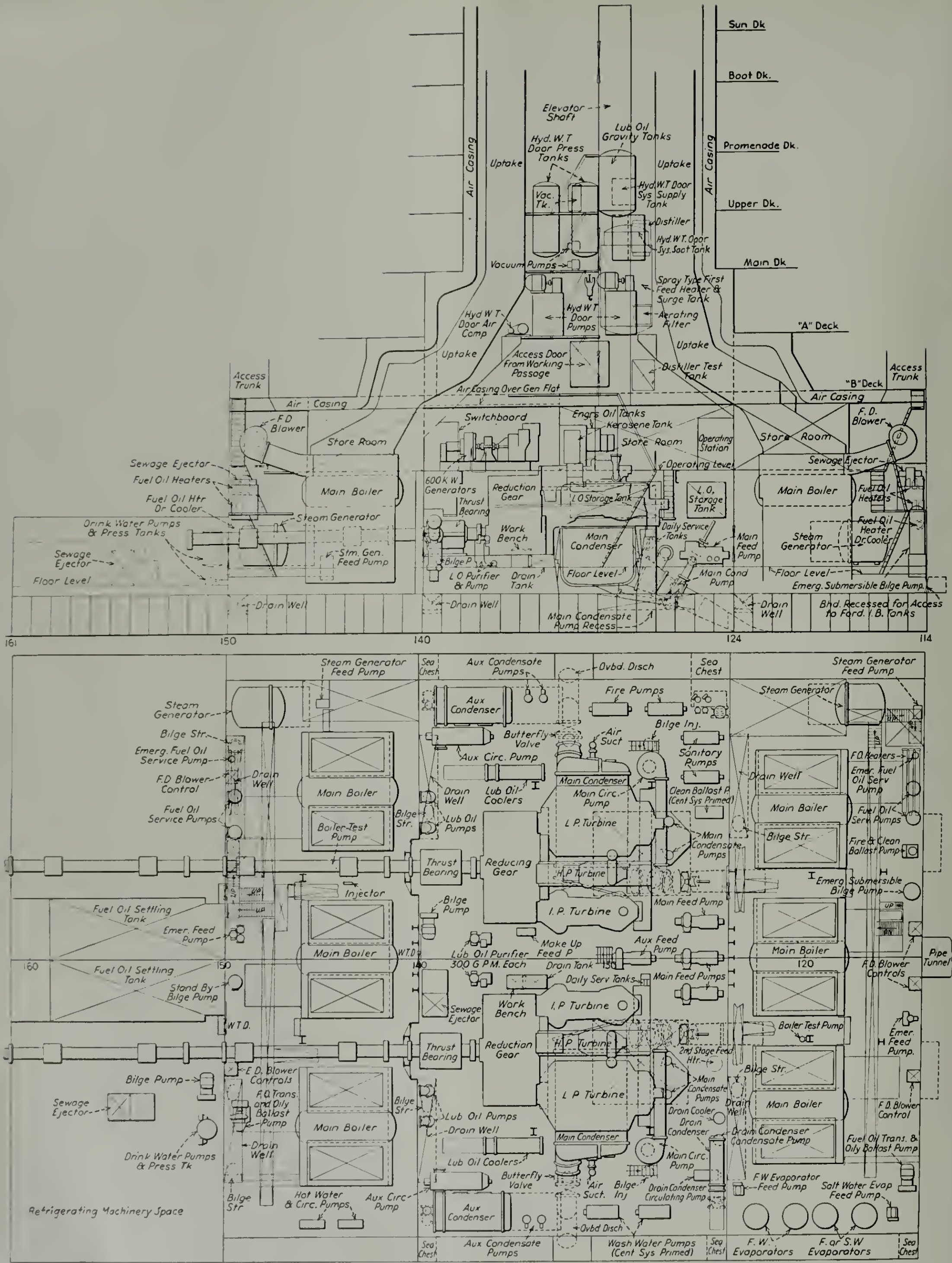
Passenger Staterooms and Public Spaces

Accommodations are located as shown on arrangement plans. The third-class dining saloon is completely air conditioned. It has a normal seating capacity of 165 and a maximum of 173. The third-class lounge is fitted with a fully-equipped cinema room. The barber shop and beauty parlor are air conditioned.

Nearly all tourist-class staterooms have a private bath or shower, and toilet. The tourist-class dining saloon is completely air conditioned, has a normal seating capacity of 230 and a maximum of 238. The tourist barber shop and beauty parlor are air conditioned.

There are: four de luxe 2-person suites, complete with sitting room, bedroom, bath and maid's room; four de luxe 2-person suites with a sitting room, bedroom and bath, and two 3-person de luxe staterooms. All cabin-class staterooms have a private bath or shower, and toilet. The cabin dining saloon is fully air conditioned. The number of passengers seated is 348 normal and 390 maximum. A musician's balcony is provided at the forward end of the well over the dining saloon. The barber shop and beauty parlor are air conditioned.

The entire promenade deck is given over to cabin-class public spaces. From forward aft, these include: the smoking room and bar; the foyer, which opens into the lounge, which is two decks in height, with a stage provided with a screen for cinema; the library; the shopping center; the cocktail lounge and the reception room, with a bar between; and the cabin ballroom. The cabin enclosed promenade surrounds all of the public spaces except the smoking room, and is fitted with (Kearfott) full-view windows. The deck covering is slate-blue grooved rubber. On the extreme after end of the deck there is an open promenade. Between the open and enclosed promenade there are heavy teak folding doors with glass fitted in the upper panels, extending from side to side of the ship. There is also a cabin-class open promenade on the



Machinery arrangement. Upper: Elevation looking to port. Lower: Plan on level just below operating grating.

sun deck outside of the houses, which completely encircles the deck.

Life-Saving Appliances, Fire Prevention and Safety Devices

The America is equipped with the usual life-saving appliances required by the Bureau of Marine Inspection and Navigation. There are life preservers of adult size for every person for whom a berth can be provided, including both passengers and crew, a total of 1,850, besides which there is an additional 10 per cent of that total in children's size life preservers. Extra buoyant apparatus, consisting of small box floats that may readily be thrown overboard, is also provided to the extent of 25 per cent of all persons on board, or 31 floats of 15-person capacity each. There are 24 cork ring life buoys distributed about the decks at convenient points for emergency use. Twelve of them have water lights attached, for night rescue work.

There are sixteen lifeboats, all on the sports deck level. The forward one on each side is a 28-foot, 35-person rescue boat propelled with oars. These boats are handled by mechanical davits and electric winches capable of hoisting the boats fully loaded. All of the other boats are handled by gravity davits with electric winches for hoisting the boat light. The second boat on each side is a 104-person, 35-foot motorboat equipped with radio sending and receiving apparatus. All of the other boats are 135-person, 35-foot boats fitted with hand propelling apparatus operating a propeller. These are the largest lifeboats thus far built in this country. The lifeboat embarkation deck is the sun deck, where provision is made for holding the boats close to the deck edge, and gates are provided in the rails to permit ready access to the boats. All boats are of steel, and are fitted with detachable aluminum skids to assist in going down the high side of a listed ship.

All partition and public space bulkheads are made practically fireproof. In the fire-screen steel bulkheads, insulated with incombustible material, by means of which all stairways are protected and the ship divided into fire zones, the fire doors are all arranged so that they may be closed simultaneously or in groups from the fire-control station on the sports deck near the bridge. These doors are spring-closing devices, and the electrical device which normally holds them open may be released by touching a button in the fire-control room or locally at each door.

The ship is so filled with safety provisions and safety devices that it became necessary to make two sets of elaborate safety plans, one set relating to "Fire Control" and the other to "Flooding and Lifesaving." By this means it is hoped that the officers and crew will learn the location and function of the many devices provided for the safety of their ship.

Although the ship is so nearly fireproof, all of the things relating to fire are still more elaborate than ever. In any case, the ship seems to be supplied with safety devices to such an extent as to be about as safe as possible; she is easily the safest passenger liner in existence.

Machinery—General

The design of the machinery, as well as of the hull, represents a compromise between the ideas of at least four elements, the United States Maritime Commission, the owners, the U. S. Navy and the builders. The machinery layout was naturally strongly affected by the fact that the vessel was primarily to be a running mate for the Manhattan and Washington, which had already been in service for several years, had given excellent satisfaction to the owners and had established a splendid reputation with the traveling public. The power was increased just enough to give a little more margin of speed for making up lost time when required. Presumably the vessel would often be operated by crews recruited from the other two vessels, and, therefore, machinery arranged in a somewhat similar manner to theirs would be advantageous.

For this reason many of the general features were retained, twin screws, triple turbines with reduction gears, six boilers. The steam pressure and temperature have been advanced somewhat from the previous practice, and the high-pressure turbine was made of the impulse type throughout, increased in speed and fitted with double reduction gearing. The intermediate and low-pressure turbines are of moderate speed, and single reduction is retained, the main gear being the largest marine gear so far produced in this country. The boilers were made of the encased type, which permits the obvious advantage of open firerooms. Due to the increased beam, it was found practicable to arrange all the propulsion auxiliaries in the engine and boiler rooms, thus reducing the length of the machinery space and of the main steam pipes. The main condensers were located beneath the low-pressure turbines instead of above, thereby insuring reliable drainage from the turbines at all times. Condenser circulation by scoops was retained. This arrangement, which is an off-shoot from naval practice, has been found most satisfactory in service, is probably of equal efficiency with pumps, and has the advantage of saving space and of eliminating the necessity of maintaining two vital constant running auxiliaries. The contaminated steam system was retained, but reduced in capacity and complexity. The main feed and condensate system is of the completely closed deaerating type.

There will be found a noticeable absence of non-vital automatic equipment, in marked contrast to the present-day tendency, the operators preferring to rely on the results obtainable with a trained and dependable personnel.

The arrangement of machinery is as shown in the plans herewith.

Propulsion Turbines

The propulsion turbines were designed and built by the Newport News Shipbuilding and Dry Dock Company. Each set of turbines consists of one high-pressure, one intermediate-pressure and one low-pressure turbine in series. The turbines are designed to deliver to the propellers a total of 34,000 shaft horsepower at 128 propeller revolutions per minute when supplied with steam at 400 pounds gage and 715 degrees F. at the chests and exhausting at 29 inches vacuum, and are designed for approximately equal distribution of power. The astern elements are designed to deliver a total of 19,500 shaft horsepower at 95 propeller revolutions per minute with steam at 385

pounds and 715 degrees F. at the chest. The turbines are capable of operating continuously at 10 per cent overload. Three hand-operated control valves on the high-pressure chest provide economical operation from overload to approximately 15 knots cruising speed.

Each set of turbines is protected against over-speed and loss of lubricating-oil pressure by a governor system operating a steam-thrown quick-closing valve located between the throttle and high-pressure turbine chest. The overspeed element is on the low-pressure turbine and is set at 118 per cent of the designed revolutions per minute.

All the turbine glands are of the labyrinth type. The gland on the inlet end of the high-pressure turbine has one additional leak-off pocket which vents into the high-pressure receiver. The leak-off vapor is discharged by a fan to the gland leak-off cooler section which is incorporated in the main air ejector after condenser. Three turbine bleeder connections are provided to supply steam for feed heating and for the fresh-water evaporators. All turbines are equipped with pivoted segmental-type thrust bearings.

The high-pressure turbine is of the single-flow impulse type, and operates at 3,300 revolutions per minute. It has one two-bucket wheel and seven one-bucket wheels, all forged integral with the shaft. The rotor is of forged steel, and the casing, chest and diaphragms of cast steel. The diaphragm nozzle plates and nozzle blocks are of corrosion-resisting iron. All the blades are machined and have integral roots.

The intermediate-pressure turbine is of the reaction type, single-flow, and operates at 1,500 revolutions per minute. It has a total of 46 rows of moving blades in six groups. The rotor is of forged steel of the built-up hollow-drum type in two sections; the casing is of cast steel. The first four groups of blades are of Monel Metal, end-tightened, and the last two groups are of 70-30 brass. The high-pressure astern element is incorporated in the same casing. The astern rotor consists of one three-bucket impulse wheel. The materials for the astern blades, nozzles, etc., are the same as for the high-pressure ahead turbine.

The low-pressure turbine is of the reaction double-flow type, and operates at 1,500 revolutions per minute. Each half has a total of twenty moving blades arranged in ten groups. The rotor is of forged steel of the built-up hollow-drum type in two sections. The casing is of cast iron, and is arranged for downward exhaust to an underneath condenser. All casing blades are of 70-30 brass. The rotor blades are of 70-30 brass in the first four groups and of corrosion-resisting iron of segmental construction in the last six groups. The low-pressure astern element is incorporated in the same casing. The astern rotor consists of two three-bucket impulse wheels with blades of corrosion-resisting iron machined. The forward end of the casing in the way of first stage astern, the intermediate diaphragm and nozzle blocks are of cast steel.

Main Reduction Gears

There are two sets of De Laval reduction gears of the double helical type. The intermediate-pressure and low-pressure turbines drive through single reduction, and the high-pressure turbine through double reduction gearing. The principal particulars of the gears are as follows:

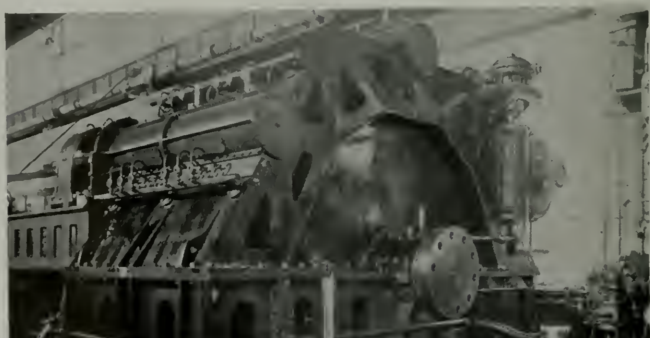
	Pitch diameter, inches	Face, inches	Helix angle, degrees
High-speed pinions	13.00		
High-speed gear	28.40	Two 15.0	45
Low-speed pinions	14.80		
Low-speed gear	174.00	Two 25.5	30

All turbine rotors are connected to the pinions by claw-type flexible couplings. The high-pressure high-speed gear is connected to the high-pressure low-speed pinion through a quill shaft and claw-type coupling. The pinions are of nickel steel forgings, 200 to 240 Brinell; the gear rims and the high-speed gear, which is solid, are of carbon steel 160 to 190 Brinell. The spider of the low-speed gear is of special cast iron in two halves bolted together. The high-speed gear housing is of semi-steel; the low-speed gear housing is of welded construction with steel castings and plates. The shaft-turning gear is mounted on the gear case.

Boilers and Air Heaters

Steam is generated by six Babcock & Wilcox watertube, three-drum express-type, oil-burning boilers. The boilers are totally encased so as to operate under forced draft in open firerooms, and are fitted with superheaters, desuperheaters and air heaters. The air casings are double, the outer surface being kept cool by having the outer space receive a portion of the air direct from the blowers.

The boilers have a total evaporating surface of 63,000 square feet and are designed for a total evaporation of 315,000 pounds per hour normal and 346,000 pounds per hour maximum with 300 degrees F. feed temperature. The normal steam condi-



One of the sets of De Laval speed reduction gears for the main propulsion turbines of America.

tions at the superheater outlet are 425 pounds gage and 725 degrees F. The boilers are designed for a maximum steam pressure of 500 pounds gage. A saturated steam connection is provided on the steam drum of each boiler. A submerged coil-type desuperheater is fitted in each steam drum. Each boiler is fitted with six mechanical atomizing fuel-oil burners of the Decagon type.

The air heaters are of the horizontal tube type arranged on each side of the boiler and have a total heating surface of 6,560 square feet of heating surface per boiler. Under normal conditions the air temperature leaving the heater will be 307 degrees F., and the stack gases leaving the heater 312 degrees F.

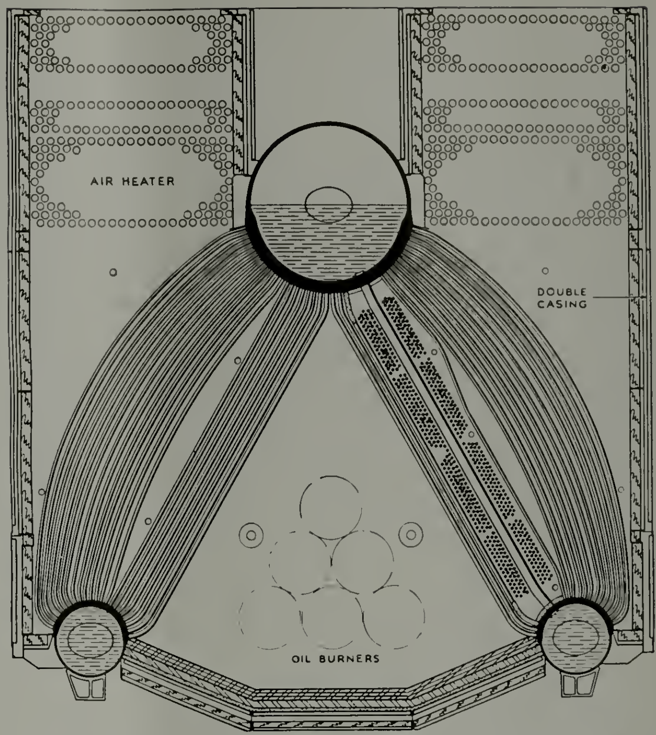
Uptakes, Stacks and Dust Catchers

There are two stacks having outside streamlined casings. The forward stack, which is a dummy, houses the emergency generator and related equipment. Uptakes lead from each boiler to individual (Vortex) centrifugal dust catchers located above the fidley top which have independent smoke pipes to the top of the stack. The stack gases enter the bottom of the dust catcher, passing by a stationary cone and vane assembly, which causes the gases to whirl in a free spiral vortex while proceeding toward the outlet. The whirling gases throw the solids outwardly to the shell, where they drop through side ports to a dust channel and from there by gravity to ash ejectors. They are expected to remove from the stack gases 97 to 98 per cent of all entrained solids, 0.002 inch and larger.

There are six motor-driven forced-draft blowers, one for each boiler, of the turbovane type, and each capable of delivering 22,000 cubic feet per minute at eight inches of water. The motors have 50 per cent speed regulation. The forced-draft blowers take suction from the boiler rooms and discharge independently to the air heaters on each side of the boilers.

Shafting, Bearings, Torsionmeters and Propellers

The main thrust bearings are independent of and located aft of the reduction gears. They are of the (Kingsbury) pivoted-shoe type, six shoes ahead and astern, and are capable of absorbing a maximum thrust of 230,000 pounds in either direction. They are self-lubricating, and are arranged for oil circulation from the turbine lubricating system.



Sectional elevation of one of the six Babcock & Wilcox three-drum express-type water tube boilers.

The line shafts are 20¾ inches in diameter and 21 inches in the way of bearings. Each line of shafting is made of eight sections; each section is supported by two steady bearings of the ring-oiled type. The propeller shafts are 22⅝" in diameter and are fitted with (Bethlehem Steel Co.) composition liners in two sections. The stern tubes are of cast steel in two sections, bolted together, and are fitted with long bearings lined with lignum-vitae. A torsionmeter is installed in each line of shafting.

The propellers are (Cramp) four-bladed, solid bronze, airfoil, 19 feet 6 inches diameter, 18 feet 2 inches to 19 feet 7 inches varying pitch, 24-inch rake and 24-inch skew-back. The developed area is 148.6 square feet and the weight approximately 20 tons each. The propeller design was based on exhaustive studies and model tank tests.

Main Condensing Plant

The plant for each set of main turbines includes a single-pass main condenser, one circulating pump for maneuvering, two centrifugal condensate pumps and air ejectors and condensers. The main condensers, designed and built by the Newport News Shipbuilding and Dry Dock Company, are suspended athwartships underneath the low-pressure turbines.

The main circulation is by scoops, a regulating valve being fitted in each outlet branch to guard against undue condensate depression when operating in the North Atlantic during winter.

Each condenser has 16,000 square feet of cooling surface and is designed to maintain a vacuum of 29 inches at normal power with 65 degrees F. injection temperature. The shells are of welded steel plate construction and the tube sheets of rolled Muntz metal. The tubes are (Revere)

70-30 cupro-nickel alloy, expanded into the tube sheet at the inlet ends and packed with metallic and fiber rings at the outlet ends. Each condenser is served by two sets of two-stage tubejet air ejectors mounted on a common combined inter and after condenser. The after condenser has a separate section, which receives the air and vapor from the main turbine gland leak-offs.

Auxiliary Condensing Plant

There are two plants, each of which serves two 600-kilowatt turbo-generators. Each plant is complete with one two-pass auxiliary condenser, one circulating pump, two condensate pumps and air ejectors and condensers.

The auxiliary condensers are designed to maintain a vacuum of 28.5 inches with an injection temperature of 78 degrees F. when condensing the steam flow from two turbo-generators operating at full load. Each condenser has 2,400 square feet of cooling surface.

Drain Condenser Plant

This system consists of a condenser, two air ejectors, one circulating pump and one condensate pump. The condenser is designed to receive the drains from the ship's heating system, fresh-water heater, galley and laundry, and may also receive the exhaust from the reciprocating pumps and the drains from the evaporators and steam generators. The drain condenser is four-pass and of the same construction and material as the main condensers. It has 150 square feet of cooling surface, is specially designed to handle flashing drains and is capable of maintaining a vacuum of 15 inches. Air is drawn from the condenser by duplicate single-stage air ejectors, which discharge into a section of the dynamo ejector after condenser.

Contaminated Steam System

This system is entirely independent of the boiler feed system, and supplies steam to the fuel-oil heaters, fuel-oil heating coils, lubricating-oil heating coils and swimming pool salt-water heaters. There are two complete generating plants, one in each boiler room. Each plant consists of one high-pressure evaporator, one motor-driven feed pump, inspection tank and drain tank. The evaporators each have a capacity of 7,500 pounds of steam per hour at 125 pounds gage.

Boiler Feed and Condensate System

The feed and condensate system is of the closed deaerating type arranged for stage feed heating as shown in the diagram. The condensate from each main and auxiliary condenser is discharged by its condensate pump to the deaerating heater via its own inter and after air ejector condenser, the drain cooler and the deaerating heater vent condenser, and is maintained continuously above atmospheric pressure to avoid the possibility of air leaks. The feed pumps take suction from the deaerating heater and discharge to the boilers via the high-pressure feed heater.

The first-stage or deaerating heater is of the (Worthington) direct-contact spray type, with vent condenser, and has a storage compartment of about 4,600 gallons capacity. It is designed to heat the total feed to about 230 degrees F., and to deaerate the condensate to a maximum oxygen content of 0.01 cubic centimeter per liter.

The heater is supplied with auxiliary exhaust, low-pressure bled steam from the main turbines and generators, vapor from the fresh-water evaporators and with reduced-pressure live steam if any deficiency occurs while maneuvering. It is located about 35 feet above the feed pumps to insure against vaporization at the feed pump suction.

The second-stage, or high-pressure, feed heater is of the straight-tube, vertical four-pass type, and is capable of heating the total feed to 300 degrees F. when supplied with high-pressure bled steam from the main turbines at 70 pounds gage. The drains from the heater are led to the drain cooler.

Lubricating Oil System

Each set of main turbines and reduction gears is served by an independent lubricating-oil system of the gravity type, which consists of two pumps, two coolers and a 1,500-gallon gravity tank. One pump and one cooler are spares. The circulating water for the cooler is taken from the main condenser injection system.

There are provided two 3,000-gallon storage tanks and one 3,000-gallon reclaiming tank which serve both systems. The systems include also a lubricating-oil reclaiming pump, lubricating-oil heater and two 300-gallons-per-hour (Sharples) lubricating-oil purifiers.

Fuel-Oil Service System

A complete fuel-oil burning system is provided in each boiler room, and includes two main pumps, one steam-driven emergency pump, one set of heaters and one drain cooler. The main pumps, which are motor-driven, of the (Quimby) rotary-screw type, take suction from either the forward or after settling tanks and the fuel-oil transfer manifold via a duplex strainer and discharge to the burner manifolds. For starting fires a connection is provided from the diesel-oil tanks in the forward stack. Quick-closing cutout valves are fitted at each burner manifold.

The heaters are of the sectional G-fin quadruple marine type. The drain coolers are of the horizontal G-fin type.

Boiler Make-Up Feed and Evaporating Plants

The installation is so arranged that only distilled water is fed to the boilers. Make-up feed is normally drawn to the main or auxiliary condensers from the distilled-water tanks located aft between the shaft alleys, or is supplied to the deaerating heater as vapor from the fresh-water evaporators. A sudden demand for make-up feed is met by the make-up feed pump, which takes suction from the distilled-water tank, with an emergency connection from the reserve feed tanks, and discharges to the deaerating heater via the condensate system. There are two fresh-water make-up feed evaporators of the single-effect, vertical, multi-coil, submerged type, with a combined rated capacity of 75 tons per day. There are two fresh-water or salt-water evaporators which are duplicates of the fresh-water evaporators and have a combined rated capacity of 50 tons per day when fed with salt water. Both evaporators are served by one feed pump.

Pumps

All pumps normally in operation are motor-driven, except the feed pumps. The main feed pumps, auxiliary feed pump and main circulating pumps are of the turbine-driven centrifugal type. Steam reciprocating pumps are provided for emergency use. The turbines for driving pumps are designed to operate with superheated steam. Steam reciprocating pumps are designed to operate on saturated steam.

A central vacuum priming system is installed, which serves all centrifugal pumps which have a suction lift

and permits the use of standard pumps without the complication of individual vacuum-producing equipment. This system includes a 25-cubic-foot vacuum tank and two motor-driven automatic start-and-stop vacuum pumps.

Sanitary Systems

Cold salt water at 75 pounds pressure is supplied to fixtures throughout the ship from a system which is served by two sanitary pumps. The sanitary system is cross-connected to the fire main and has a connection to the auxiliary cooling system and emergency connection to the refrigeration circulating system.

Fresh water to plumbing fixtures is supplied by two washing water pumps which take suction from the washing water tanks and discharge into a 500-gallon pressure tank. The pumps are automatically controlled by a pressure-operated switch.

Hot fresh water is supplied from two heaters of the storage tank type, located in the engine room and supplied from the washing water pressure system.

A separate drinking and culinary water system is served by two pumps which take suction from the drinking water tanks and discharge to a 250-gallon pressure tank. All fresh-water taps in the galleys and in the main and service pantries are served from this system. Iced drinking water is supplied from a branch fitted to the scuttle butt and served by pumps in duplicate.

The swimming pool is filled from the fire main and emptied by the bilge pump. The water in the pool is continuously freshened by make-up from the sanitary system, and is warmed by being circulated through a heater.

Sewage System

All interior deck drains, plumbing fixtures and soil drains from below the bulkhead deck lead into sewage tanks. One or two sewage tanks are located in each watertight subdivision, and receive the drains in that space. There is fitted a total of 13 tanks, each served by two pumps of the non-clog type, fitted with self-cleaning sewage screens, and each pair is fitted with electric automatic control arranged to operate the pumps alternately.

Fire Main Deck Wash System

The fire main is served by two motor-driven centrifugal pumps, by the fire and clean ballast pump and the sanitary pumps. Separate systems of mains and risers are provided for hydrants inside the house and for those outside exposed to freezing weather. Pressure is continuously maintained on the inside system, and a pressure gage is fitted in the fire-control station to indicate the fire-main pressure.

Bilge and Ballast Systems

The bilge system is arranged to pump from all holds and machinery compartments. The two motor-driven triplex plunger bilge pumps, the standby centrifugal pump, the submersible self-priming bilge pump and the two fuel-oil transfer and oily ballast motor-driven triplex plunger pumps are connected to the bilge service. Bilge suction valves from all hold compartments are operated by hand at place and hydraulically from controls in the machinery hatch.

There are two separate ballast systems, one for clean and one for oily ballast; that is, for ballast which is placed in fresh washing water tanks or in fuel-oil tanks, as the case may be. Provision is made for pumping clean ballast tanks when either the engine room or the forward boiler room is flooded. This system is also connected so as to supply circulating water to the refrigeration system when the vessel is in dry dock.

Bilge and oily ballast water may be pumped overboard direct, or to a closed-type oil and water separator of about 100 tons per hour capacity.

Smoke Detecting and Smothering

A steam smothering system protects all fuel-oil settling tanks, deep tanks and wing tanks. All cargo holds, cargo 'tween decks, cargo trunked hatches, refrigerated cargo spaces, boiler rooms, paint and oil store rooms and the lamp room are protected by a (Walter Kidde and Company) combined smoke-detecting and manually-operated CO_2 system. The detecting cabinet is located in the fire-control station. The emergency generator room and the cinema rooms are protected by independent CO_2 systems. CO_2 hose protection is provided for the engine room and boiler rooms.

Mechanical Ventilation, Heating and Air Conditioning

Ventilation air is supplied by 50 supply systems and removed by 32 exhaust systems. Air is supplied to all passenger staterooms at an average rate of about 40 cubic feet per minute per person. A change of air is supplied every eight minutes to the public spaces, every six minutes to the crew's living spaces and every 4.5 minutes to the air-conditioned dining saloons. Exhaust ventilation is provided for all public spaces, toilets and showers, galley, pantries, hospitals and all other spaces necessary for the removal of heat and odors. All cargo spaces except the refrigerated cargo spaces have mechanical supply at the rate of one change every 30 minutes, and natural exhaust.

Each boiler room is ventilated by two 50,000 cubic feet per minute supply fans, and the engine rooms by two 50,000 cubic feet per minute supply fans and by two 25,000 cubic feet per minute exhaust fans which draw from the generator flats, switchboard and operating platform. The refrigerating machinery spaces are ventilated by two 4,000 cubic feet per minute supply fans. The boiler room and engine room supply fans discharge to their respective spaces through air casings which surround the machinery hatches and are fitted overhead in the machinery spaces. These casings are fitted with numerous outlets to produce a distributed flow throughout so as to minimize the heat transmission to adjoining living spaces.

All ventilation fans can be shut down by the operation of a pushbutton in the fire-control station in case of fire, but the fans in the unaffected zones may be restarted locally, if desired. Each ventilation system is provided with a damper which may be closed in case of fire, thus preventing the possibility of a draft up through the ventilation trunks. Ventilation trunks to cargo spaces passing through passenger or crew accommodations are provided with automatic draft checks in the trunk at the boundary of the accommodation space, which are set with fusible links so that, if fire occurs in a cargo space, the draft check will automatically close.

The heating system in the living spaces is designed to maintain a temperature of 70 degrees F. with an outside temperature of − 10 degrees F. The heating of cabin and tourist-class staterooms is by warm ventilation air. The main air supply may be tempered by preheaters to 50 degrees F. Parallel with the main air ducts is a supplementary system in which the air may be still further heated to a maxi-

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Pacific Northwest Marine Notes

by Chas. F. A. Mann

View inside Hull No. 1, Seattle-Tacoma yard, showing progress of construction.
(Photo by Turner Richards)

● **Ahead of Schedule at Tacoma Yard**

So smoothly has the organization of a fast welding crew and plate shop personnel proceeded that production at the Tacoma plant of the Seattle-Tacoma Shipyard is far ahead of schedule, and plans are now announced to launch the first of the five Maritime Commission ships on August 1 instead of September 1, with the unofficial possibility that the first hull will break away for deep water as early as July 15.

Likewise, the second hull is coming along at a fast pace, and much earlier launching date is planned for this one.

Our illustrations show the status of Hull No. 1 up to May 12.

Rumors continue that the yard will shortly go after some important Naval orders, and possibly more cargo ships, if the Commission's budget is suddenly increased by the present session of Congress.

Word from General Machinery indicates that the big diesels for the first two hulls are now on the test stand. Meanwhile, the first set of Washington diesels is ready on the test stand at the big Seattle plant of the Washington Iron Works.

● **25 Large Wooden Hulls Building**

Tacoma's six busy wooden shipyards are turning out a record high number of husky diesel vessels for the Pacific Coast towing and fishing fleets, ranging from Puget Sound to San Diego. More than half of the 1940 crop of large seiners are for Monterey and Southern California owners.

● **Foss Shipyard**

Newest Foss tug to join that famous fleet is the Oswell Foss, husky new diesel tug just completed at the Foss Shipyard in Tacoma.

The new tug is 74 x 19 and has an 8-cylinder, 450-H.P. Supercharged Enterprise diesel for main propulsion; 2-way radio telephone set; a Caterpillar diesel auxiliary electric generating set; full electric deck machinery; pumps; and refrigeration. She carries an air ram steering gear and neat quarters for a crew of six. She is heavily built of Alaska cedar and will be used on fast, long tows on Puget Sound.

No. 1 on ways at Tacoma, May 3. Taken from roof of plate shops, showing snow-crowned Olympics in distance.
(Photo by Turner Richards)

● **Fish Vessel Western Pacific**

One of the most elaborate refrigeration plants to be placed on a fishing vessel built in the Pacific Northwest is the layout planned by the Baker Ice Machine Co. for the new super-de luxe albacore fishing ship Western Pacific, now completing at the busy plant of the Western Boat Building Corp. at Tacoma. Albacore is the species that, when canned, is known as tuna, and is caught by short, stiff poles wielded by husky fishermen. The Western Pacific was built for the Western Pacific Packing Co. of San Diego, and will be delivered about August 1, to fish off the Oregon-Washington coast and then go to San Diego.

Her hull is 100 x 26 x 13 feet overall, with a capacity for about 160 tons of frozen fish. She carries a 380-H.P. Superior diesel for main drive and two 125-H.P. Superior diesels to operate the 100 per cent electrified deck machinery and elaborate brine system.

The refrigeration plant consists of multiple compressor layout, all electrically driven, supplying refrigera-

tion to 8 double-constructed wood tanks below, each 10 x 10 x 10 ft., and 2 large tanks mounted on deck, each 15 x 8 x 26 feet, to carry bait outward and albacore on the inward voyage. Insulating effect is obtained by the double thick calked wooden walls, dead air space between tanks and outer skin, and the outer skin of the hull. The process of handling the albacore will be carried out in 3 stages. The fresh caught fish will be dumped into the tanks with ordinary sea water brine held at 28 deg. F. This brine will be pumped overboard and a heavier salted sea water brine at 10 deg. F. will be pumped over the fish, quickly freezing them. In the third stage, the brine will be drained off, and coils lining the walls of each tank will keep the fish frozen until delivered at the canning plant.

Tug Oswell Foss on trials.
(Photo by Ray Krantz)

Three 5½ x 5½-inch Baker compressors, driven by three 20-H.P., 3-phase, 220-volt motors with suitable controllers, are fitted. V belt drive is employed. One three-section ammonia condenser, an 18-inch by 10-foot ammonia receiver, three 3-H.P. brine circulating pumps and a 5-H.P. brine pump and a twin-cylinder 2½ x 2½-inch Baker refrigeration pump complete the main refrigeration layout. The cooling coil system for the tanks consists of nine sets of 1¼-inch tank coils 650 feet in length each.

This accounts for the elaborate auxiliary diesel power layout, nearly half as large in capacity as the main engine. About 160 tons of frozen albacore can be carried and held indefinitely until unloaded at the cannery.

● Western Boat Building Corp.

In addition to the large tuna clipper vessel Western Pacific, described in this issue, there is also building at the Western plant the seiner St. Francis, first of a type without a net turntable. She is 94 x 24 x 10, and will carry a 380-H.P. Atlas. Another of the giant-type seiners for Spiro Babich is 96 x 25 x 11, and will be powered with a 400-H.P. Atlas diesel.

● Martinac Shipyards

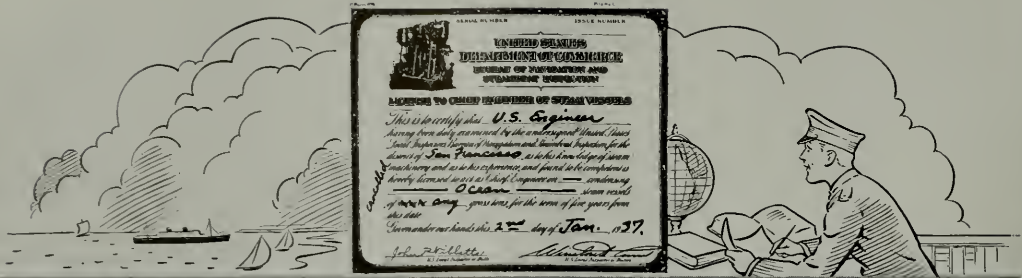
At the Martinac Shipbuilding Corp., on the City Waterway, a large new outfitting dock has been completed, and they have eight large fishing vessels under way. The Cavalcade is 92 x 23.6 in. x 11 ft. and carries a 400-H.P. Atlas diesel and a 50-H.P. auxiliary Atlas diesel. She is for W. D. Suryan of Anacortes. An 83 x 22 x 10.9 ft. seiner is building for Frank Gondalfo of San Francisco, and carries a 230-H.P. Union diesel and Exide batteries. An 83 x 21 x 10.9 ft. seiner for Salvatore Di Mercurio of Monterey, with 230-H.P. Union diesel; an 86 x 23 x 10.9 seiner with 300-H.P. Atlas and 50-H.P. Atlas auxiliary diesel for Sam Lonero of Monterey; an 83 x 21 x 10.9 ft. seiner for G. P. Cutino of Monterey, equipped with a 220-H.P. Atlas diesel and Exide batteries; one exactly like this last-named seiner for Tony Balastieri of Monterey; and lastly, a big 92 x 23.8 x 11 ft. one with 400-H.P. Atlas for Joe Di Maggio of San Francisco (relative of the baseball slugger), completes the impressive list of Martinac boats now building for the 1940 season.

Side view No. 1 on ways, Tacoma.
(Photo by Turner Richards)

● Martinolich Shipyard

As usual, the Martinolich Shipbuilding Corp. of Tacoma is busy on a fleet of new ships, including a 78-footer with a 225-H.P. Fairbanks, Morse diesel; as well as four 82-footers for Monterey fishermen. Two of them carry 240-H.P. Fair-

(Page 52C, please)



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Marine Boilers I

THEORY OF DESIGN

INTRODUCTORY

The marine boiler is such a familiar and important unit, and has been viewed inside and out so frequently by the engine room personnel, that very little space will be devoted to general descriptions. Instead, we will discuss the boiler from the viewpoint of the Rules and Regulations of the Bureau of Marine Inspection and Navigation. Some of the mathematics of the boiler will be covered. Theory, ratings, control and operation will be discussed. A series of articles will be needed for this, and the coverage of the subject will, to some extent, be guided by the letters and questions that come in.

We are all of us members of a huge class of instruction, and are privileged to send in questions, discussions, experiences, criticisms and suggestions.

Our first point of approach will be the mathematics of the stresses in a boiler. How is the maximum working pressure calculated, and where limited?

Many of the boiler stresses are subject to pure calculation, just as simple as the stress in a bolt, but also many are not so simple. To standardize on all factors and avoid guessing on those questions which cannot be nicely calculated from pure theory, the American Society of Mechanical Engineers have published the Boiler Code, a booklet which gives rules and formulas to use and places the results of practice and experience in a standard form for general use.*

To illustrate, the factor of safety is something which can hardly be calculated. How many times stronger must a bolt be than the actual load it will carry? Pure mathematics indicates that it must be only a pound or two stronger than the load, and that if you never exceed that load, the bolt will never break. But just a pound increase in the load will surely break it. We cannot guarantee the load, hence must assume arbitrarily a load 3, 4, 5 or 6 times as much as calculated or expected. Thus we allow for a stress several times as large as the actual load that normally exists, and call the ratio between them the *safety factor*.

Fortunately these safety factors are standardized and specified in Rules and Regulations, as otherwise designers would guess differently, and under pressure of reducing weight and size would approach closer and closer to a point where safety was endangered.

This safety factor takes care of many unknowns, such as variability in the strength of materials above or below the used values. If we test a dozen samples of the same batch of steel, we shall get a dozen different breaking stresses, all fairly close to each other, perhaps, but still different. Furthermore, stresses exist in the structure due to temperature which cannot be calculated or even estimated closely. Also some allowance is desirable for accidental overloads in operation.

In aviation designing, where there is such a large penalty for weight, safety factors are very much less. They may be less than 2 or only a reasonable per cent oversize rather than several times oversize. As will be seen on page 50 of Rule II, 52nd Supplement of General Rules and Regulations, the safety factor may be different for the same part, depending on the use and location. In other words, the less we know about the variable loads the larger we make the safety factor.

There are two general comments which belong in this introduction to the subject of boilers. First, that whereas the main engines, auxiliaries and accessories of the marine power

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* The General Rules and Regulations are largely based on the Boiler Code, and are an extension of the Code into marine practice.

When letters or symbols are placed together it implies the operation of multiplications; thus ST means S x T.

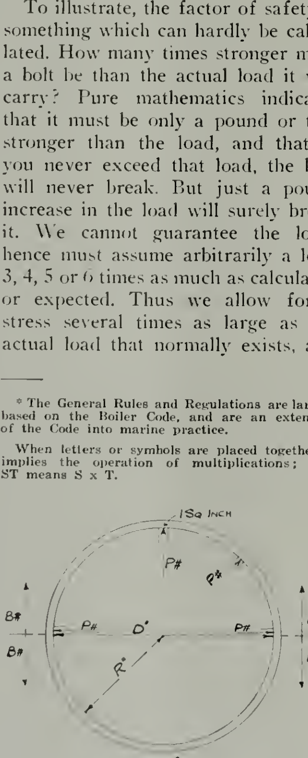

Fig. 1.

plant have long been ready for higher pressures, temperatures and efficiencies, the problems these factors introduce in the boiler for a floating plant have made it the limiting unit in the system. Secondly, by and large these problems have forced the boiler out of the boiler factory into the machine shop. The present-day boiler is made like a machine, with refined machining, true fits and a minimum of hammering and bending to close gaps.

And, in spite of all these problems and the thought and attention given to the boilers, experience seems to show that the boiler of a steamship outlasts the marine engines and perhaps the ship itself.

The cylindrical shape has been the main structural element in boilers from the very start, because the circular element is the shape any enclosed vessel will try to take under the effects of internal pressure. There are several reasons for this. The circle encloses the greatest area for a given length of enclosing line or circumference, greater than any other shape.

Also in the circle with internal pressure there are no other forces except pure tension; no bending forces. The flat fire hose becomes cylindrical with pressure, because its walls have no bending strength, only tension. It is therefore quite natural that designers will make as many elements of the boiler cylindrical as possible.

The strength of the cylinder to stand internal pressure is the subject of the main consideration in determining the maximum safe working pressure, **W**, and is one of the most important questions in the licensing examinations.

QUESTION

What formula is used to calculate the maximum safe working pressure of a cylindrical pressure vessel?

ANSWER

From page 50 of 52nd Supplement of General Rules and Regulations.

$$W = \frac{STE}{RF}.$$

If we desire thickness **T** to stand alone to get its value, we may use the rules of algebra, which permit transfer of a number or symbol from one side of the equals mark to the other side, if we also transfer it to the opposite side of the horizontal division symbol. Thus $WRF = STE$

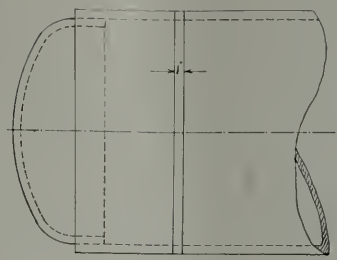

FIG. 2.

and $\frac{WRF}{SE} = T$. **W** equals maximum allowable working pressure pounds per sq. in. **S** equals tensile strength of steel pounds per sq. in. as marked on the plate by the maker. **T** equals minimum thickness of shell plate in inches and decimals of an inch. **E** equals efficiency of the riveted joint, a decimal, as determined by calculating four different possible ways of failure and using the weakest or lowest value of **E** calculated. **R** equals radius in inches of the cylinder of the shell, one-half of the diameter. Use the inside or internal radius when shell thickness is less than one-tenth of the radius. If more than one-tenth of the radius, use outer radius.

F equals factor of safety as specified in General Rules and Regulations. In solving a problem, if **F** is given as 4 the working pressure will be one-fourth the pressure which would burst the shell.

QUESTION

How is the formula developed from simple principles? How can it be tied up with the facts we already know about pressure and stress?

ANSWER

Pressure as we use the term is pounds per square inch of surface due to a fluid or gas and as measured by a pressure gage. Stress limit is the number of pounds per square inch of the cross section of the steel at which it will break or tear or stretch beyond its elastic limit. If we load a bolt of 1 sq. in. cross section up to 50,000 lbs., and if its stress limit **S** is 50,000, it would break under tension. Boiler steels have an **S** of from 45,000 to 60,000 pounds per square inch. It is possible to make steel of much higher tensile strength than this. Hard steels will go to 100,000 lbs./sq. in., but are brittle and will not stand the shock loads and temperatures and will not stretch slightly to relieve internal stress from fabrication and other loads. Plough steel, cable steel, as used in suspension bridges, will go to 200,000 pounds per sq. in. as a value of **S**. These, however, are not suitable for marine boiler construction.

Figure 2 illustrates a part of a cylindrical drum or shell. It may also represent a part of a boiler tube an inch in diameter, or the 17-foot diameter shell of a Scotch boiler.

Let us study first the stress in a longitudinal seam which is exerted in a circumferential direction. The first obvious consideration is that we do not need to study the entire seam from end to end of the drum. Any one foot will be the same as any other foot of its length. So let us consider only one inch of the length. This 1-inch section can be taken anywhere along the length, and is shown in the figure.

Figure 1 is the end view of this 1-inch section. The load will be the same at any point around the circumference of this section. We will consider it at the two points at the ends of the horizontal diameter **D**. At these points the load in the steel is **B** pounds, tending to break the steel under tension. The **B** pounds at one side plus the **B** pounds at the other side is the total load created by the pressure **P** on the inside and tending to separate the top half from the bottom half of this section.

Each square inch of the surface has a load of **P** pounds. The sq. in. at the left side next to the point of consideration has a load of **P** in a horizontal direction to the left. That unit area at the right, next to the point of consideration, has a load of **P** pounds in a horizontal direction towards the right. These two cancel each other and hence do not affect the load **B** at the point.

In like manner all the other unit areas except the one at the top have a component in the horizontal direction which cancel each other. They also have a component in a vertical direction which directly affects the loading at **B**. The net result is that we may say that the load at **B** is due to pressure **P** acting on the surface as measured horizontally. This may be proved mathematically, or we

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Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Some Laws Governing Navigation and Ship Operation III

QUESTION

What report is made concerning accidents to your vessel itself or to it personnel, and to whom? What is the penalty for not making such a report?

ANSWER

The licensed officer in command of any vessel shall report in writing and in person to the board of local inspectors nearest the port of first arrival any accident to said vessel involving loss of life or damage to an approximate amount exceeding $500, and shall also report in the same manner any casualty or loss of life from whatever cause of any person on board such vessels and any stranding or grounding, whether or not any damage has been sustained by the vessel: Provided, That when from distance it may be inconvenient to report in person it may be done in writing only, and the report sworn to before any person authorized to administer oaths.

The licensed officer in command who shall fail to make such report shall be subject to the penalty of having his license suspended or revoked.

QUESTION

Except as they may be regulated by law or international agreement or by rules and regulations made in pursuance thereof, which of the following are under the supreme control of the master?: (a) The radio installation? (b) The operators? (c) The regulation of the operators' watches? (d) The transmission and receipt of messages? (e) The radio service of the ship?

ANSWER

The radio installation, the operators, the regulation of their watches, the transmission and receipt of messages, and the radio service of the ship, except as they may be regulated by law or international agreement, or by rules and regulations made in pursuance thereof, shall in the case of a ship of the United States be under the supreme control of the master.

QUESTION

What is the rule for radio telegraph operators and communication between the bridge and the wireless room?

ANSWER

All passenger ships, irrespective of size, and all cargo ships of 1,600 gross tons and upwards, shall be fitted with a radio-telegraph installation.

Each passenger ship which is required to be fitted with a radio-telegraph installation shall, for safety purposes, carry a qualified operator, and, if not fitted with an auto-alarm, shall, whilst at sea, keep watches by means of a qualified operator or a certified watcher, as under:

(a) All passenger ships of 3,000 gross tons and over, continuous watch.

(b) All passenger ships under 3,000 gross tons, as determined by the administration concerned.

Each cargo ship which is required to be fitted with a radio-telegraph installation shall, for safety purposes, carry a qualified operator, and, if not fitted with an auto-alarm, shall, whilst at sea, keep watches by means of a qualified operator or a certified watcher, as under:

(a) All cargo ships under 3,000 gross tons, as determined by the administration concerned.

(b) Cargo ships from 3,000 to 5,500 gross tons, both included, at

Deck Officers' Licenses for April

Name and Grade	Class	Condition
SEATTLE		
W. S. Hammond, 3d Mate	SS, any GT	O
A. Eastman, 3d Mate	SS, any GT	O
E. W. Nystrom, Chief	SS, any GT	RG
SAN PEDRO		
B. C. Dennis, Master	SS, any GT	RG
L. E. Hatch, Chief	SS, any GT	RG
A. E. Danchak, 2nd Mate	SS, any GT	RG
R. D. Heron, 2nd Mate	SS, any GT	RG
T. A. Peck, 2nd Mate	SS, any GT	RG
C. E. Reed, 2nd Mate	SS, any GT	RG
A. E. Teague, 2nd Mate	SS, any GT	O
J. W. Thomas, 2nd Mate	SS, any GT	O
E. E. Butler, 2nd Mate	SS, any GT	O
SAN FRANCISCO		
R. D. Lamson, Chief	SS, any GT	RG
J. P. Blair, Chief	SS, any GT	RG
G. J. Griffin, Chief	SS, any GT	RG
H. E. Halterman, Chief	SS, any GT	RG
G. W. French, 2nd Mate	SS, any GT	RG
R. R. Richards, 2nd Mate	SS, any GT	RG
J. K. Moran, 3d Mate	SS, any GT	O

least 8 hours' watch per day.

(c) Cargo ships over 5,500 gross tons, continuous watch.

There shall be provided, between the bridge of the ship and the wireless telegraph room, means of communication, either by voice pipe or by telephone or in some other manner equally efficient.

QUESTION

What is the law concerning crew quarters, washrooms, etc.?

ANSWER

On all merchant vessels of the United States, except yachts, pilot boats or vessels of less than 100 tons register, every place appropriated to the crew of the vessel shall have a space of not less than 120 cubic feet and not less than 16 square feet measured on the floor or deck of that place, for each seaman or apprentice lodged therein, and each seaman shall have a separate berth and not more than one berth shall be placed one above another; such place or lodging shall be securely constructed, properly lighted, drained, heated and ventilated, properly protected from the weather and sea, and, as far as practicable, properly shut off and protected from the odor of cargo or bilge water. And every such crew space shall be kept free from goods or stores not being the personal property of the crew occupying said place in use during the voyage.

That in addition to the space allotment for lodgings hereinbefore provided, on all merchant vessels of the United States which in the ordinary course of their trade make voyages of more than 3 days' duration between ports, and which carry a crew of 12 or more seamen, there shall be constructed a compartment, suitably separated from other spaces, for hospital purposes, and such compartment shall have at least one bunk for every 12 seamen, constituting her crew, provided that not more than 6 bunks shall be required in any case.

There shall be provided at least one toilet, one washbasin, and one shower or bathtub, with hot and cold running water, for every six members of the crew, or portion thereof, exclusive of licensed officers. Where the number of fire room and engine room men, exclusive of officers, exceeds ten, their toilet and washroom equipment shall be separate from the other crew members, and where the steward's department crew exceeds six, their toilet and washroom equipment shall be separate from the other crew members.

There shall be at least one urinal provided for every three toilets required for the men members of crew.

To facilitate proper cleaning, painting and upkeep of crew's toilet and washroom equipment, they shall be so arranged that not more than three toilets, one urinal, three wash basins and three showers are located in any one washing place.

Wash basins for crew may be located in the crew's sleeping rooms, provided such wash basins have running water and drains, and that the proper number are available.

Any failure to comply with this section shall subject the owner or owners of such vessel to a penalty of not less than $50 nor more than $500: Provided, That forecastles shall be fumigated at such intervals as may be provided by regulations to be issued by the surgeon general of the public health service, with the approval of the Department of Commerce, and shall have at least two exits, one of which may be used in emergencies.

The local inspectors of the Bureau of Marine Inspection and Navigation shall inspect the crew quarters of every American vessel at least once in each month, or at such times as such vessel shall enter an American port, and shall satisfy themselves that such quarters are of the size required by law or regulations issued thereunder, and properly ventilated and in a clean and sanitary condition, and are equipped with the proper plumbing and mechanical appliances required by law or regulations issued thereunder, and that such plumbing and mechanical appliances are in good working order and condition.

Whenever it shall be found that the crew quarters do not conform with the required regulations, the appropriate board of local inspectors shall withdraw the certificate of inspection of such vessel, and refuse to reissue the same until such improper conditions have been corrected; and the master or other licensed officer of such vessel who shall have willfully or negligently permitted such vessel to be in such improper condition shall be subject to a penalty of not more than $500.

QUESTION

What are the rules of practice for the government of the local inspectors in the investigation of casualties to vessels and personnel, or the violation of the law or rules and regulations under jurisdiction of the Bureau of Marine Inspection and Navigation?

ANSWER

For the purpose of investigating the causes of a marine casualty or accident, and the licensed officers or certificated persons responsible therefor, three marine investigation boards have been created, namely, the "A," "B," and "C" Marine Investigation Boards.

The "A" Marine Investigation Board consists of an officer of the Department of Justice (learned in maritime law), a Coast Guard officer and a representative of the Bureau of Marine Inspection and Navigation. The jurisdiction of the "A" Board extends to all marine casualties involving loss of life, regardless of the nature of the casualty.

The "B" Marine Investigation Board consists of a supervising inspector and two principal traveling inspectors of the Bureau of Marine Inspection and Navigation. The jurisdiction of the "B" Board extends to all marine casualties not involving loss of life, and classified by the Secretary of Commerce as serious.

The "C" Marine Investigation Board consists of a supervising inspector and two representatives of the Bureau of Marine Inspection and Navigation. The jurisdiction of the "C" Board extends to all marine casualties or accidents not involving loss of life and not classified as serious by the Secretary of Commerce.

The board cannot make a final decision in any case, but shall, when the proceedings are concluded, make a record of their proceedings and submit such record with their findings, opinion and recommendations to the director of the Bureau of Marine Inspection and Navigation. The director, after a thorough analysis and review of the record, findings and recommendations will make the final decision.

(Page 60, please)

Strength of the Tuna Clippers

By David W. Dickie, N. A.

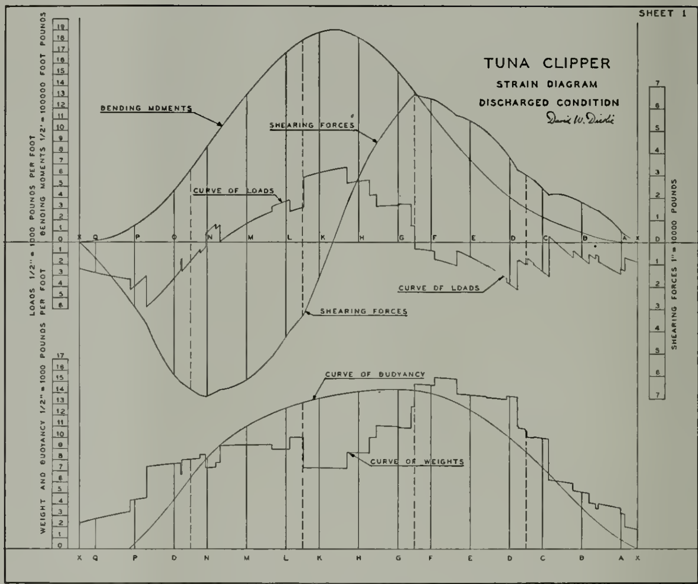
Several of the tuna clippers have had propeller shafts break, and several have had trouble with sea valves, broken piping near the sea valves and thrust shaft trouble. At least four have sunk from broken piping trouble. This is the second time the accompanying curves have been made for a wooden vessel, the first having been published in *Pacific Marine Review* for March, 1937.

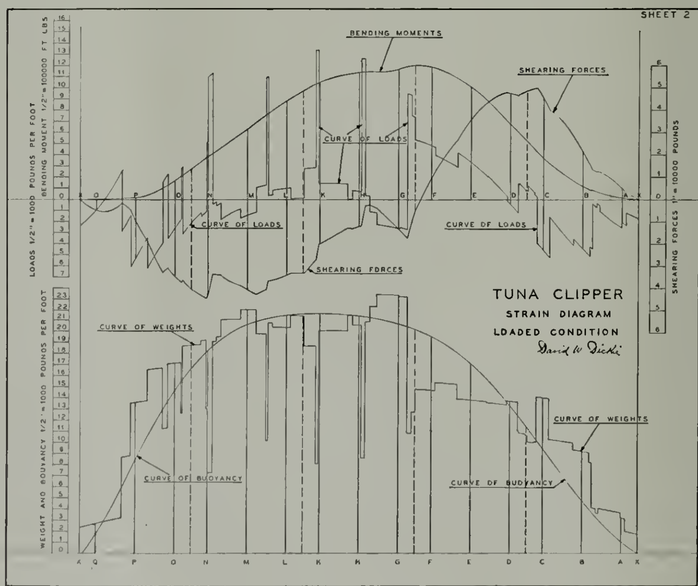
In this case the curves have been made for two conditions, with the vessel fully loaded and after discharging, to show what takes place in the strains of the vessel.

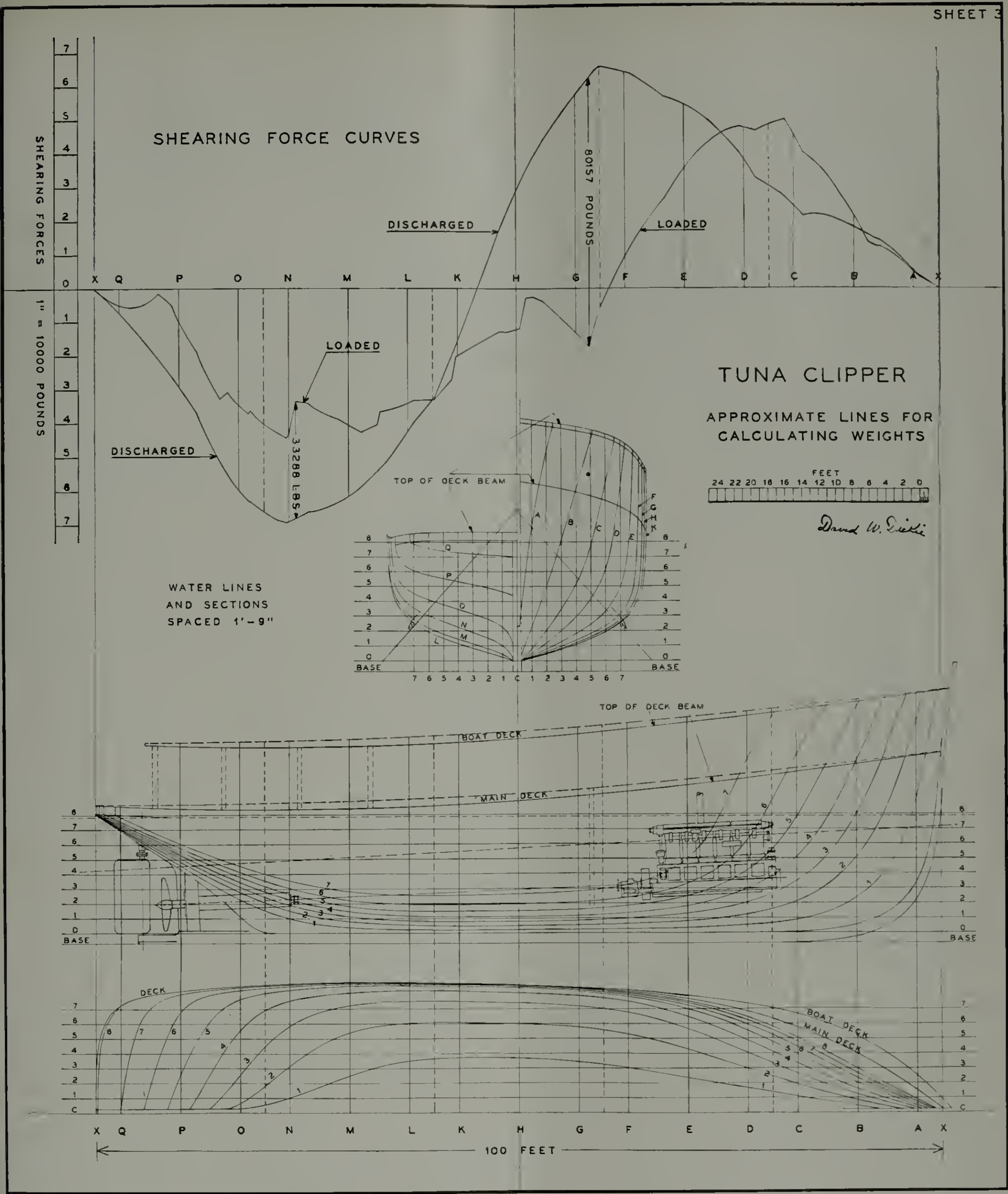
The Curve of Weights is made by erecting the various weights of the boat on a straight line in the relative position on the boat so the height from the base line to the curve represents the weight per foot of the completed boat at any point.

The position and the amount of weight in the boat varies considerably with the design of the refrigerating plant. In this case there are four 6" x 6" double-cylinder ammonia compressors forward, three condensers and a receiver aft. The compressor size was selected to take advantage of an improvement that is coming on the market for a unit of that capacity. The brine tank was published in the February, 1940, *Pacific Marine Review*. There are two 3-section Pak-Ice machines, with 5-horsepower motors each, so one can be used on sea water and one on 22 per cent brine while the preliminary and final freezing is going on.

On the voyage outbound, all wells not used for bait are partially filled with cooled sea water and slush ice from the Pak-Ice machines. The fish are caught and tossed into the slush ice, the sea water being renewed from the brine tank until the blood and gurry are disposed of. The sea water is discharged overboard







and the slush ice retained. Twenty-two per cent brine from the brine tank is put into the wells with the fish and the mass cooled to zero, leaving the brine in the wells to prevent oxidation of the fats.

The Curve of Buoyancy represents the displacement of the boat in pounds per foot at any selected point.

The Curve of Loads is the difference between the Curve of Buoyancy and the Curve of Weights.

The Curve of Shearing Forces is the integration of the Curve of Loads, and the Curve of Bending Moments is the integration of the Curve of Shearing Forces.

Due to the large number of bulkheads in the tuna clippers, there is not much chance for distortion in the hull of the vessel except where the bulkheads are improperly fastened and pull away from the side of the vessel. For that reason the Bending Moment Curve is not of prime importance, as the vessel bends due to the holes in the wood crushing and becoming oval at the

(Page 52C, please)

On the Ways—SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

NEW CONTRACTS DURING APRIL

Bethlehem Steel, Sparrows Point

Two oil tankers 442′ x 64′ x 34′ 10″; 3,000-H.P. turbine; 8,000 gross tons. Union Oil Company of California.

Three passenger-cargo vessels 465′ x 65′ 6″ x 39′ 9″; 8,600-H.P. turbine; 8,300 gross tons. Mississippi Shipping Co.

Federal Shipbuilding and Dry Dock Co., Kearny, N. J.

Two cargo vessels 465′ x 69′ 6″ x 33′ 6″; 8,500-H.P. turbine; 8,900 gross tons. Matson Navigation Co.

One oil tanker 440′ x 66′ 6″ x 34′ 6″; steam; 7,700 gross tons. Pan American P. & T. Corp.

Newport News Shipbuilding and Dry Dock Co., Newport News, Va.

Two cargo vessels 465′ x 69′ 6″ x 33′ 6″; 8,500-H.P. turbine; 8,900 gross tons. Matson Navigation Co.

Sun Shipbuilding and Dry Dock Co., Chester, Pa.

One oil tanker 521′ x 70′ x 40′; 7,500-H.P. diesel; 11,400 gross tons. Sun Oil Co.

Two oil tankers 500′ x 68′ x 37′; 12,000-H.P. turbines; 10,000 gross tons. U. S. Maritime Commission.

This makes a total of 13 seagoing merchant vessels with an aggregate gross tonnage of 115,600 gross tons, 6 of which are for Pacific Coast owners and operation.

In addition to the above vessels for the seagoing merchant marine, there were new contracts placed during April for 32 miscellaneous craft aggregating 12,975 gross tons.

Union Oil Orders Two More Tankers

Contracts calling for the construction of two 13,000-ton tankers have been placed by **Union Oil Company,** according to W. L. Stewart, Jr., vice president. The ships will be built in accordance with Union's tanker fleet replacement program, and are slated for delivery in 1942.

The vessels will be of the single screw American three-island profile type, with straight-raked stems and cruiser sterns, and will be constructed by the **Bethlehem Steel Company** at the **Sparrows Point, Md.,** shipyard. Like the Paul M. Gregg, which was contracted for earlier this year, the new tankships will be sister ships to the company's L. P. St. Clair and Victor H. Kelly, now engaged in Pacific Coast service.

These two vessels are the fourth and fifth in the orderly replacement program inaugurated by the Union Oil Company with the tanker L. P. St. Clair. These tankers are of the Bethlehem-Frear fluted bulkhead type of hull construction powered with Bethlehem high-pressure cross-compound turbines, Falk double-reduction gearing and Foster Wheeler steam generators.

Bethlehem Launches Last of Three

The last of three high-speed national defense feature tankers to be built for Standard Oil Company of New Jersey at the Sparrows Point Yard, Shipbuilding Division, Bethlehem Steel Company, was launched on April 27 at 12 o'clock noon. The new vessel was christened the Esso Albany by Miss Ellen E. Kiltgaard, daughter of Carl E. Kiltgaard, assistant general manager, Marine Department, Standard Oil Company of New Jersey.

A luncheon in honor of the sponsor, given by Bethlehem Steel Company at the Belvedere Hotel, Baltimore, followed immediately after the launching. Both functions were attended by a number of officials of Standard Oil Company and Bethlehem Steel Company, as well as guests from New York, Baltimore, Annapolis, Washington and elsewhere.

The Esso Albany represents the latest improvements in tanker design and construction, including the Bethlehem-Frear system of bulkheading, and extensive use of welding. She will have a deadweight in excess of 16,300 tons and a cargo carrying capacity of over six million gallons. The principal characteristics are as follows:

Length overall	553 feet
Beam (molded)	75 feet
Depth (molded)	39 feet
Speed	18 knots

The entire construction, including

all living quarters, is fireproof throughout, and all accommodations are designed to conform to the highest standards of comfort.

The navigation equipment is of the most modern type, and every precaution has been taken to insure the safety of the vessel and crew at sea.

The ship is built to the highest class of American Bureau of Shipping, under their special survey, and in accordance with the regulations of the Bureau of Marine Inspection and Navigation. She complies with the highest requirements for carrying petroleum products through the Panama and Suez Canals.

Bid Date Postponed

On May 3 the U. S. Maritime Commission announced that the date of opening bids on the P-4s had been postponed from May 7 to June 18.

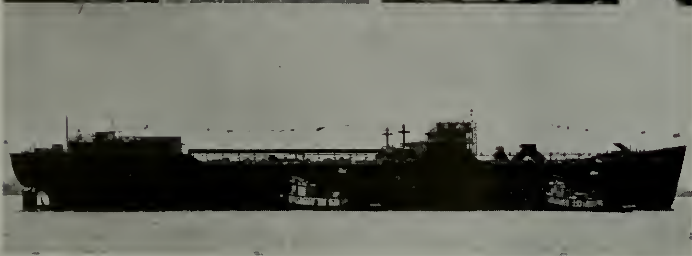
The P-4s are the luxury passenger liners proposed for operation by the American President Lines on the transpacific route from Pacific Coast ports to the Orient on the same service now covered by the President Coolidge and the 535 type President steamers.

The P-4s will be the largest and finest vessels ever built in an American shipyard. Their size and some of their design features are outside the experience of the majority of American shipyards, which probably explains the delay in bids.

Sun Launches A. R. C. Tanker

The Atlantic Refining Company's new 19,405-ton tanker, Robert C. Tuttle, was launched on May 11 at the yards of the Sun Shipbuilding and Dry Dock Company, Chester, Pa. The new vessel was christened by Mrs. Robert C. Tuttle, wife of the vice president of the Atlantic Refining Company, for whom the latest addition to the Atlantic fleet is named.

Robert C. Tuttle is a turbo-electric tanker of all-welded construction, and



is similar in design to her three sister ships of the Atlantic fleet—J. W. Van Dyke, Robert H. Colley and E. J. Henry—all commissioned within the past three years. The new oil carrier will be the eighteenth electrically-propelled ship designed by Atlantic engineers, and her addition to the fleet will give Atlantic more electrically-propelled vessels than any other company in the world.

Overall length of the new tanker is 544 feet. Capacity is the equivalent of 156,000 barrels, or 6,552,000 gallons. She has 5,000 horsepower, providing a sea speed of 13.25 knots. The steam generating system operates at 625 pounds pressure and at a steam temperature of 920 degrees Fahrenheit.

She will be placed in service in July on the run between Philadelphia and Texas Gulf ports.

These three illustrations show the launching of the Atlantic Refining Company tanker Robert C. Tuttle at the yard of the Sun Shipbuilding and Dry Dock Company, Chester, Pa. At the upper left, Mrs. R. C. Tuttle, wife of the vice president of the oil company, konks the bow of the ship in the best wifely manner as she bestows thereon the name of her good husband. Upper right shows ship just leaving ways, and lower view is a broadside in the Delaware River as the tugs are taking charge.

STATUS OF UNITED STATES MARITIME COMMISSION SHIPBUILDING PROGRAM — May 1, 1940

Type of Vessel	Contracts Awarded	Keels* Laid	Launched	Delivered
Passenger — U. S. Lines	1	1	1	—
Passenger & Cargo — Mississippi Shipping Company	6	3	2	—
Passenger & Cargo, C-3	15	8	—	—
Cargo, C-3	18	16	10	5
Cargo, C-2	40	20	18	16
Cargo, C-1B	34	11	—	—
Cargo, C-1A	4	2	—	—
Cargo, American Export Lines	8	7	4	4
Cargo, Seas Shipping Company	6	1	—	—
Tanker	20	12	11	9
Totals	152	81	46	34

*As of April 1, 1940.

RECAPITULATION OF CONSTRUCTION CONTRACTS AS TO TYPE AND POWER

Type	No.	Gross Tons	Steam	Diesel	Turbo-Electric	Diesel Electric
Cargo	92	676,000	62	30	—	—
Passenger	22	212,600	18	4	—	—
Tanker	45	439,860	32	11	2	—
Tug	15	2,565	—	15	—	—
Towboat	14	4,780	1	13	—	—
Ferry	3	5,610	1	1	—	1
Carferry	1	6,000	1	—	—	—
Trawler	1	250	—	1	—	—
Schooner	1	95	—	1	—	—
Oil Barge	39	19,700	—	—	—	—
Cargo Barge	15	8,475	—	—	—	—
Coal Barge	25	9,820	—	—	—	—
Deck Barge	6	1,140	—	—	—	—
Salvage Barge	1	395	—	—	—	—
Derrick Barge	1	345	—	—	—	—
Totals	281	1,387,635	115	76	2	1

U. S. Shipbuilding

The two tables herewith show at a glance the character and types of ships building under the present shipbuilding program in the United States.

The upper table gives the status of the Maritime Commission construction by types of ships. A casual analysis of this table indicates that the Commission will have to speed the contracts up considerably if it is to have 500 ships built in 10 years. We are well into the third year of the 10, and 81 keels laid so far.

The lower table gives a comprehensive picture of all the merchant vessels now under construction or contract in American shipyards, including the Commission program and dividing the vessels as to type and drive. Very interesting are the totals, showing a healthy proportion of diesel powered vessels, and a total gross tonnage under construction larger than in any former year excepting the years covering the Shipping Board war-time effort. The 92 cargo vessels are all under Maritime Commission program. Of the 45 tankers, 25 are private contracts not under Martime Commission.

Merchant Marine

Importance in War Crisis

by Comm. Robert C. Lee

Vice-President, Moore-McCormack Lines

Some time after 2 o'clock one morning not long ago, I was startled awake by the telephone, and received the amazing news from Washington that German troops had begun an invasion of Norway. This information came, of course, because of the knowledge of the State Department that the Moore-McCormack Lines in their American Scantic Line service were operating American flag ships to Norway. At the time, we had in New York one ship about half loaded; also, we had a few days out of New York, and then off Newfoundland, a ship fully laden and bound for Bergen; a third ship bound for Bergen was a little west of longitude twenty—the western boundary of the neutrality zone; a fourth ship actually in Bergen discharging; and a fifth ship in Trondheim nearly discharged and partly loaded for the homeward trip. Allowing for the six hours difference in time, you will see that it was then approximately half past eight in Norway. The invasion had begun at daylight only two or three hours before that. Necessarily, the information at hand was extremely sketchy. Orders were given to stop loading and to the ships at sea to heave to by steaming slowly back towards the United States. Communication with the two ships in Norwegian ports proved impossible at the moment. As the situation cleared, and more information kept coming in, within about forty-eight hours we were able to give the final orders to discharge the partly-loaded ship and to instruct the two ships at sea to return to the United States without further delay. Then followed the uncertain period when we were endeavoring to communicate with our ships in Norway—not knowing whether we were reaching them or not. The State Department, the British Embassy and the German Embassy were all very helpful, and I am sure did everything possible to get messages through to our ships abroad, but it is interesting to note from the masters' report that the first actual information the ships received came in a short wave broadcast sent out by the National Broadcasting Company. The ships, of course, had their own radios and equipment capable of sending and receiving messages, but the military authorities had closed these stations and sealed them. The officers and men, however, had been allowed to keep their own small receiving sets, and with these sets picked up the first news that they got from us.

A few days later a message finally reached us from Captain McHale from Trondheim. It was his judgment that it was safe for him to proceed and he had permission from the military authorities to do so. He requested authority to sail and to bring some refugees and some of our American employees stranded in that port. Our masters are carefully selected and trained to be good mariners, but to consider their first rule, that of safety. We were confident that we could leave it to the judgment of our masters to decide upon the situation with a great deal more certainty than could we. It was our firm belief that our vessels would not move if it did not appear more than reasonably safe to move. The State Department was agreeable to the ship sailing, but considered the risk too great to permit any except the crew to come with the ship. We regretfully had to leave behind all except the members of the crew. We gave permission to our ships to sail when in the master's judgment he thought it prudent to sail. As the world knows, our two ships are now safely home.

The American Scantic Line was one of the earliest established efforts of the United States to develop the American Merchant Marine on essential trade routes. This little history of the ending of that effort has been recited as an introductory lesson, from which future predictions can be made. The first dislocation of the American Scantic Line, which Moore and McCormack had been operating since 1920 to all Scandinavian and Baltic ports, came with the enactment of the Neutrality Law. Our ports had been Oslo, Gothenburg, Copenhagen, Stockholm, Gdynia, Helsingfors and Leningrad, and a number of other principal loading ports in the Baltic. The last two of our ships on that run had to come from the Baltic through mine fields with German naval officers as pilots. In place of all these fine ports we were suddenly restricted to the limited facilities of Bergen, Trondheim and Narvik. It would almost seem a complete disaster, but with much ingenuity our organization abroad solved the difficult problems confronting them and we were able to continue a very active service, pouring American cargo into all of Scandinavia through these three small ports. Now the Norwegian invasion had written finish to that.

The first reaction to the Neutrality Act was that it was a death blow to the American Merchant Marine which Admiral Land and his associates in the United States Maritime Commission had just begun to fashion into a formidable armada. Profoundly affected was the American Scantic Line, and apparently completely put out of business were the United States Lines, our major effort in the North Atlantic, the America France Line, the American Merchant Line, the American Diamond Line, the Dixie U. K. Line, and perhaps others that do not come to mind. In all, one hundred and forty ships suddenly were unable to continue their normal operation. It certainly looked as though there was a bad time ahead for American shipping.

But a war such as now inflamed the world is far-reaching in its effect.

The most determined neutral cannot escape some of the consequences of the conflagration. In the last half of the 19th century, and early days of the 20th, we had allowed the American Merchant Marine to decay to such insignificance that in 1914 we were carrying in American flag ships something less than nine per cent of our overseas cargo. The World War almost overnight withdrew the great fleet of foreign ships that were serving American commerce. The effects upon us were disastrous. Perhaps they did not know it, but every small farmer even was injured by this situation as the world clamored for our supplies, which crowded along the seaboard and lay there for months on end unable to find ships in which to move. The same dislocation of foreign tonnage occurred in the present war—not to the same extent as yet, but nevertheless of considerable magnitude. But this time we were somewhat nearer ready for the difficulty. We had created a Merchant Marine of our own that was handling more than thirty-five per cent of our ocean-borne traffic, and while the days following the enactment of the Neutrality Act seemed black and foreboding for American ships, in no time at all they all found themselves absorbed and extremely busy in new trade routes more or less abandoned to them by the foreign flag ships called home. The American Scantic Line ships have found profitable trade to South America. The United States Lines ships are employed in the Mediterranean, and so it goes. Certainly one of the clearest truths that have been demonstrated by the present world conditions is the absolute futility of a great nation like the United States attempting to exist in the world without an adequate merchant marine, which is a commercial defense in time of war between other nations, and which will quickly become a part of our naval defense should we unhappily become involved in war.

That the United States will enter into the present war with her armed forces does not for the moment appear to be even a remote possibility, and so this is a very good time to look to see that our powder is dry; that we take advantage of the marvelous natural defense of water barriers, and provide a navy in each ocean competent to meet the threat of any force that could be brought against it; that we have an air force of world supremacy and that we have a merchant marine thoroughly able to provide us with commercial security in time of peace and naval security in time of war.

Why all these precautions?

In 1914 no sensible American even thought of discussing the possibilities of the United States entering the European War. Today, a few months after the outbreak of a second world war in Europe, our two great political parties are trying to out-shout each other and the Communists as to who will keep us out of the war. I do not believe that this hysterical wail is the voice of America. There is no danger of America ever going to war so long as the great mass of her people feel as they do today—that it is not our fight. But when the mass of her people do determine that it is our fight, we will be at war with all our might. America is still a nation of free men, and free men are free only so long as they are willing to fight for their freedom.

A German customs guard on the Dutch border the other day, talking with an American newspaper man, stated the case for Germany. "We are fighting for 'labensraum,'" he said. Such was the philosophy of ancient and medieval conquest. In the crowded world of today there is no living room to be gained by force of arms that will not be drenched with the blood of its rightful owners. This ancient philosophy of war was succeeded by an equally untenable motive—"conquest for trade." War was for commercial expansion. These economic causes for war have come down to the present day.

But I see a glimmering of a new world thought, the beginning of a new idea and a new era. All of this din about reciprocal trade treaties, protective tariffs, division control, value control, arbitrary Government control of export and import, the expansion of each selfish nation's world markets, may prove but a jousting with windmills. A new method of conquest is afoot in the world.

On the 31st of May, when the Good Neighbor ship Brazil of the Moore-McCormack Line sails from this port, she will have on board Maestro Toscanini and the National Broadcasting Company's renowned symphony orchestra. Through the cooperation of a great American communication company and a great American steamship company, this new army of conquerors will go forth armed only with their musical instruments and their great talents. Six concerts in Brazil, two in Uruguay and eight in the Argentine will bring them conquest, for I am confident of their victory. The listeners on this network will, for the first time in the history of man, hear from a ship at sea, far down over the horizon—yes, far down over the equator—a symphony of wonderful music.

(Radio address broadcast from Station WJZ)

Impulse Steam Traps, a 16-page publication by the Yarnall Waring Company, illustrating and describing the Yarway impulse steam trap. This trap has the following advantages:

No levers, buckets, weights, bellows or floats.

Continuous discharge under heavy loads.

Intermittent discharge under light loads.

Discharges air as well as condensate.

Minimum size and weight.

No supports other than the pipe line.

Standard for all pressures within broad range.

No changes of valve seat.

Low first cost and maintenance.

U. S. Liner America

(Continued from Page 39)

mum of 160 degrees F. The ventilation outlet to each stateroom permits a mixture of the hot and the cool air so that both the volume and the temperature are under the control of the passenger through a simple finger-operated knob. In public spaces, other than those which are air-conditioned, the heating is done by warming the ventilation air to a maximum of 85 degrees F. and supplemented by steam radiators.

Refrigeration

The refrigeration machinery rooms are located in the hold aft of the after boiler room. The machinery consists of three (Carrier Corporation) Freon compressors direct-driven by 75-horsepower motors, four Freon condensers, five brine coolers and four Freon liquid receivers.

The compressors are of the vertical single-acting, 8-cylinder V-type, and have 27 tons capacity on refrigerating duty and 78 tons capacity on air-conditioning duty. One compressor, two condensers and one brine cooler take care of the air conditioning, and two compressors, two condensers and four brine coolers take care of the refrigeration. The arrangement permits any compressor and condenser to be used for any duty. The plant is served by: two condenser circulating pumps; three brine pumps, which supply brine to the cargo cold diffuser coils and the ship's stores spaces; four brine spray pumps, which draw from the diffuser sump discharge to the diffuser sprays; two brine pumps, which supply brine to the air-conditioning units; two brine pumps, which supply brine to ship's service boxes; and one cargo brine recirculating pump, which recirculates brine through the cold diffusers for temperature regulation when maintaining temperatures higher than 10 degrees F.

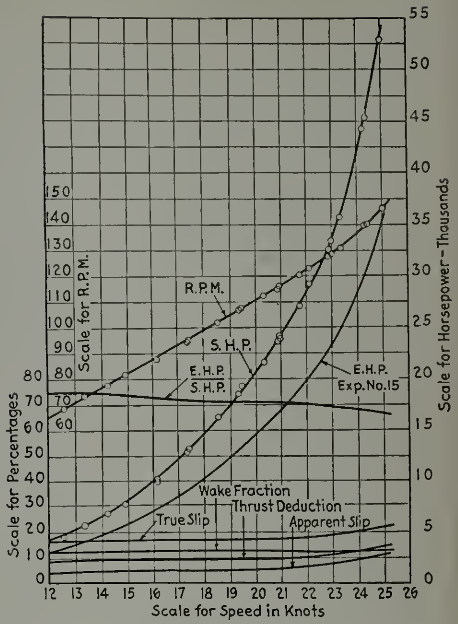
This plant refrigerates about 40,000 gross cubic feet of cargo carried in four compartments at 10 degrees F., 40,000 cubic feet of ship's stores in 19 spaces at various temperatures from 8 degrees to 50 degrees F., 1,700 cubic feet in 17 ship's service boxes, makes 2,000 pounds of ice in 24 hours, supplies the scuttle butt and the air-conditioning units.

There are four cold diffuser units of the brine spray type, one in each cargo space. Each unit has a capacity of 8,300 cubic feet per minute and discharges the air to the space through overhead ducts.

Generating Plant

The main generating plant consists of four geared (General Electric) turbo-generators each rated 600 kilowatts, 120/240 volts, 3-wire, direct current with an overload rating of 125 per cent for two hours and 150 per cent for five minutes. The connected load is as follows: motors, 3,465 kilowatts; galley, 839 kilowatts; lighting, 765 kilowatts; heating and miscellaneous, 268 kilowatts; total, 5,337 kilowatts.

The emergency generating plant consists of a 150-kilowatt, 120/240-volt, 3-wire, direct-current compound-wound (Westinghouse) generator coupled directly to a (General Motors) diesel engine. It is located in the dummy stack above the highest deck. Fuel is supplied by gravity from tanks located in the dummy stack on the level above the engine, and the generating set is independent of any other auxiliary on the vessel.



Speed and power curves as figured from model tests.

Storage Batteries

For automatic and instantaneous supply to the "preferred" emergency circuits for light and power, there is provided a 240-volt storage battery with a capacity of 200 amperes con-

Artist's conception, U. S. liner America

tinuously for two hours. For the stateroom call bells and other low-voltage interior communication systems there are provided duplicate 24-volt storage batteries. It is estimated that the capacity of each battery is sufficient to operate the system at normal demand for one week. Two batteries similar in type, rating and arrangement to those for the interior communication systems are provided for the fire alarm system. All batteries are located in the storage battery room adjacent to the emergency generator room, and are automatically kept in a fully charged condition.

Motor Generators

Two direct, alternating current motor generators each with an output of 10 kilowatts (15 kilovolt-amperes), 120 volts, 60 cycles, single phase, are provided for power supply to "Selsyn" type telegraphs, motion picture equipment and other appliances requiring alternating current.

Distribution System

The main switchboard is of the conventional "live-front" type with fused lever switches up to a rating of 200 amperes and carbon circuit breakers for feeders beyond the capacity of 200-ampere fuses, all mounted on marine finished asbestos lumber panels. On each generator panel is mounted a 3,000-ampere circuit breaker, a generator switch and a full complement of pilot lights, instrument switches and instruments.

The emergency switchboard is of the same type as the main switchboard and is located in the emergency generator room. For convenience, the interior communication and battery-charging switchboards are combined with the emergency switchboard as one structure, which contains also the automatic bus transfer contactor for battery supply to the preferred emergency circuits.

Lighting System

The most unusual feature of the lighting system for this vessel is the extensive application of totally indirect lighting and the consequent high total wattage of lamps. Cabin and tourist-class public space lighting is practically all of the indirect type, using concealed coves and long troughs extending in some cases the full length of the room. The fixtures in the principal cabin and tourist-class public spaces have alternate lamps arranged on separate circuits to permit subdued and even lighting by the cutting out of one-half of the lamps. In the cabin ball room, cabin lounge, tourist lounge and third-class lounge, this system is supplemented by a dimmer arrangement, permitting any degree of illumination from full bright to blackout. In the cabin lounge and ball room the dimmers are motor-operated and remotely controlled by master switches. For the cabin lounge stage, foot and border lights in color with dimmers are provided.

All staterooms and passages are supplied by two independent circuits so that none of these spaces can be put in darkness by the failure of one circuit. This is in addition to the emergency exit lighting required by law.

Lighting in passenger staterooms, third-class public spaces, officers' and crew's quarters, machinery spaces and cargo spaces is of the conventional type, except for the universal use of anodized aluminum or solid bronze lighting fixtures in lieu of the usual plated finishes. In addition to the usual complement of running, signal and anchor lights, there are other lights fitted to meet British and German harbor regulations and Canal rules. Floodlights are arranged for illumination of the water along the ship's sides when handling lifeboats, and for illumination of the two stacks. The total number of lighting fixtures is 7,278; the total number of lamps is 14,500 of an aggregate of 765,000 watts.

All power equipment, except for certain portable or semi-portable equipment with motors of fractional horsepower rating, operates on 230-volt direct current, and is generally of conventional type. Seven hundred and fifty-one 12-inch, three-speed, oscillating marine-type bracket fans are provided. Exclusive of bracket fans, there is a total of 550 motors on the vessel of ratings ranging from 1/8 horsepower to 150 horsepower, the total combined rating of which is 4,038 horsepower.

Communication Systems

Provisions for interior and exterior communication include unusually complete facilities for the transmission of orders for ship control and navigation, for detection of fire, for alarm in case of emergency and for subsequent direction and control of passengers and crew, for comfort and convenience of passengers and for radio communication. The most modern navigating equipment is provided, including (Sperry) gyro-pilot, Fathometer, pitometer log and radio direction finder.

For ship control and navigation, there are provided electrical self-synchronous telegraphs supplemented by mechanical telegraphs, and "sound powered" telephones supplemented by voice tubes. In addition to its emergency use for indicating dangerously shallow water, the Fathometer is used to determine the ship's position by checking the contour of the ocean's bottom indicated by successive depth readings against that shown on the chart. The pitometer log indicates the ship's speed in knots and integrates the distance traveled; with the course recorder chart this instrument provides an accurate basis for dead reckoning when the weather does not permit observations.

The fire alarm equipment is of the latest supervised type and is similar in design to the equipment developed for naval vessels. On account of the fireproof hull construction, thermostats are not fitted in the staterooms, but are fitted in the public spaces, lockers and storerooms. The (Remler) general announcing system provides loud speakers for direct communication from the ship's officers to the fire-fighting crew quarters and to the boat handling and embarkation stations. This should be of great assistance in preventing panic in case of collision, fire or other casualty. An independent system is provided for radio broadcasting and making announcements of general interest to the passengers.

The passengers' call bell system consists of "steward" and "stewardess" call buttons in each stateroom registering on local annunciators in the passageways; each of these annunciators has an extension call on group annunciators in pantries; each of these group annunciators has a further extension call on a single central supervisory annunciator that may also be used as the service annunciator during periods of minimum activity.

The radio equipment is designed for both low- and high-frequency transmission, and is arranged for two-way ship-to-shore conversations.

(To be continued)

Pacific Northwest Notes

(Continued from Page 41)

banks, Morse diesels, and are for Sal Ventimiglia and Leonard Ventimiglia; and two of them carry 350-H.P. Enterprise diesels, and are for John Spidera and Sal Marianna, respectively.

● Tacoma Boat Building Yard

At the plant of the Tacoma Boat Building Co. we find two 83-foot seiners with 220-H.P. Atlas diesels on subcontract; an 83-foot seiner with 260-H.P. Enterprise diesel for Olaf Haney; 2 halibut boats for Svare Janerd and Mr. Edwards, with 165-H.P. Gray diesel and 70-H.P. Atlas diesels respectively; and a 50-ft. troller for Steward Davis of Chinook, Wash., on the Columbia River, with 150-H.P. Buda diesel.

A record season, with $700,000 worth of ships for Tacoma's busy wood shipyards specializing in strong hulls with diesel power.

● Joe Williamson of Seattle's Marine Salon

Due to the rush with which the big story on the Explorer was handled in our April issue, we forgot to mention that the entire job of photography on this ship, from keel laying to the send-off on her shakedown cruise, including all photos of her equipment which appeared in *Pacific Marine Review,* was the product of Joe Williamson, proprietor of the Marine Salon of Seattle.

Joe—not Joseph — is an indefatigable marine photo specialist, having negatives of over 9,000 ships and marine men and equipment. His side line is passport and marine seascape work. Puget Sound tugboat operators expectantly await Joe at least twice a month, to turn up just as a tug is quitting port for a two-day voyage around Puget Sound, where he stands for hours shooting scenery and odd angles of passing ships—on the forward deck, like an old figurehead from a sailing ship.

Like the fire-chaser, Joe is always first when a boat has a collision. He hires airplanes and speedboats, and delays ferryboat sailings, and can paddle a canoe at 10 knots if there is a marine smash-up to photograph. It is getting so that Joe Williamson has to spend an increasingly large amount of time in Federal Court as witness for insurance companies, and to help settle squabbles that arise between shipyard and owner during construction or remodeling.

● Huge Caisson Gate Launched

To wall off the outer end of one of the largest graving docks in the world, the naval dock at Bremerton Navy Yard, one of the largest caisson gates ever built, has been launched at the plant of the Winslow Marine Railway and Drydock, on Bainbridge Island.

The new caisson gate is a diamond-shaped submarine, literally, and draws 28 feet of water light, despite its huge tonnage of scrap steel and concrete ballast.

The gate will be finished and painted at the plant before towing to Bremerton, probably about June 1.

● Columbia Channel Contract

The General Construction Co. of Seattle, on a bid of $284,000, was awarded a contract April 21 by the U. S. Engineers to dredge a 27-ft. channel from Camas, Washington, up-river to Bonneville, Ore., permitting deeper-draft ships to operate to The Dalles port, Oregon.

● New Steamship Co.

Headed by D. S. Tobias, Horace Hall and J. C. Irvine, the World Steamship Co. was organized April 25 at Seattle with a capital of $50,-200. The new company plans to buy, sell and charter ships for the Pacific Coast trade.

Strength of Tuna Clippers

(Continued from Page 47)

fastenings. A well-designed wooden vessel needs considerable more wood than the strength calculations require, to provide fastening to keep the wood members from sliding upon each other. However, the insulation of the vessel against heat loss also requires more wood than otherwise necessary, and if the insulation feature is taken care of there is ample wood for strength purposes.

The Shearing Force Curves of a wooden vessel always show where trouble may be expected, and on Sheet 3 the Shearing Force Curves for the two conditions are superimposed and placed in relation to the approximate lines of the vessel.

It will be noticed that the after peaks of the Shearing Force Curves come almost exactly at the place where the propeller shafts have broken. Many of the vessels have been fitted with Monel Metal propeller shafts, which so far have given no trouble. The work of D. J. McAdam, Jr., the eminent authority on the subject, indicates that Monel Metal will stand considerably more abuse than steel, especially as a propeller shaft running in a bent condition, as indicated by the curves, but even he states that, "the corrosion fatigue limits mentioned in my 1927 A.S.T.M. paper should not be considered as limits below which the metals would not fail."

When the machinery is installed in the tuna clippers, the vessels are bent more and more as the weights go aboard, and when loaded the vessel tends to straighten out, due to lesser shearing force in the loaded condition. This accounts for the propeller shaft breaking when the vessels are new. When a propeller shaft is renewed the machinery must be lined up again to get the couplings to register with each other, and after a vessel is seasoned for a voyage or two the propeller shaft should be uncoupled and inspected for alignment. The difference of the shearing forces at the after maximum points of stress is 33,288 pounds.

The losses that have occurred by damage at the forward maximum points of stress of the curves have been exactly what might be expected. The difference between the shearing forces, loaded and discharged, at this point is 80,157 pounds, and the hull of the boat is buckling locally. The movement travels along a pipe to a threaded coupling, and after a while it lets go and floods the ship. The constant reversal of the shearing forces every

time the vessel is loaded and discharged tends to work the fastenings loose in the structure of the ship.

Each one of the boats now in service is a different problem to compensate for the strains shown by the curves, but for new boats there are some suggestions that would help to correct the conditions:

(1) If the frames were made of two flitches 8" thick with an 8" space between, making them 24" centers, they would have less tendency to twist as the boat strained, due to having a surface of 8" to fasten against.

(2) The ceiling of the boat has to be at least 5" thick, and should be 6", to take care of insulation against heat losses. If it was made 5" thick and edge fastened through 2½ planks with ⅝" drift bolts 24" centers, it would keep the planks from sliding upon each other. The other way to do it is to fit two thicknesses of 3" ceiling, the first bolted to the frames with ⅝" drift bolts, and the second through-bolted to the frames with ⅝" clinched bolts. Between the 3" thicknesses there should be one coat of standard emulsified asphalt and one coat of troweled emulsified asphalt, asbestos and 8-20 Navy Specification cork dust. As the temperature in the wells varies from 86 degrees to zero, the bolts will work loose if there is not a cushion provided to take up the difference in length of them from the varying temperatures.

(3) The rubber companies are now making rubber expansion joints to standard flanged pipe sizes. If these are fitted in the pipe lines near the sea valves, some of the movement will be compensated for, and the strain eased on the piping. Also, the short length of rubber pipe serves as a deterrent to the electrolytic action of the salt water where different metals are in close proximity. To use the expansion joints effectively, a piece of pipe about 4 to 8 feet long should be placed in each pipe line with an expansion joint on each end. This leaves the piping system free to change alignment and direction.

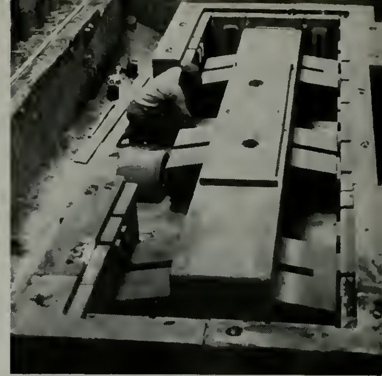
Gear Cases for C-1 Motorships Building at South San Francisco

For the five Maritime Commission C-1 ships now building at the Western Pipe & Steel Company, San Francisco, Farrel-Birmingham Company, Inc., Ansonia, Conn., and Buffalo, N. Y., are furnishing five two-pinion reduction units in which the housings, covers and bearing caps are made of Farrel Meehanite.

Farrel Meehanite castings were selected to be used in these gear drives for several reasons. First, it has been found that Meehanite has superior sound and vibration-dampening effect. Tests show that Meehanite has a dampening effect seven times that of steel. Consequently the use of this material contributes to the smooth, quiet operation of the propulsion units.

Second, maximum stiffness and rigidity are assured by the use of Farrel Meehanite housings because the engineering design can be worked out to take advantage of the inherent characteristics of the metal and the method of its manufacture. Stiffness and rigidity are of great importance in keeping the pinions and gears in a two-pinion unit in strict alignment, which results in longer life for the revolving elements and less trouble with bearings and accessories.

After the Meehanite casting is finished and cleaned of sand, it is placed in a stress-relieving oven and all casting stresses and strains are relieved.



Cement molds for Farrel Meehanite gear cases are made by the Randupson process.

This assures that the casting will not change its shape after being machined nor after it is installed in the vessel.

Farrel Meehanite, briefly, is a process-inoculated iron containing a high percentage of heavy melting steel scrap and made in various processes to meet specific requirements. The housings of the propulsion gears for the five ships are cast from 35M Meehanite, and have a minimum tensile strength of 40,000 lbs. per square inch in the ladle test bars taken at the time of casting. Some of the smaller castings are also made of 35M Meehanite, and the bearing caps are made of 50M Meehanite and have 50,000 lbs. or more tensile strength.

Meehanite is used extensively in all Farrel-Birmingham machinery because of its superior physical properties, ease of control of the melting process to secure predetermined characteristics, its close grain, uniform density, freedom from hard spots and spongy areas, easy machinability and other advantages.

Gear case for the main diesel drive of C-1 ships building at Western Pipe & Steel Company.

PACIFIC MARINE
Reviews

Westinghouse Executives Visit San Francisco

When the Westinghouse Electric & Manufacturing Company decided "to put its executive offices on wheels" for a study of industrial and commercial problems and developments of the West Coast, it chose a group of its topmost officers and executives to take the trip.

Among the group were:

A. W. Robertson, chairman of the Board

Ralph Kelly, Vice President in Charge of Sales

Marvin W. Smith, Vice President in Charge of Engineering

L. W. Lyons, Treasurer

Andrew H. Phelps, General Manager of Purchases and Traffic.

Purpose of the trip—to obtain a first-hand impression of 1940 business conditions in the West.

MARVIN W. SMITH Vice President in Charge of Engineering **ANDREW H. PHELPS** General Manager of Purchases and Traffic **CHAS. A. DOSTAL** Pacific Coast District Manager
RALPH KELLY Vice President in Charge of Sales **A. W. ROBERTSON** Chairman of the Board

Steamboater's Reunion

The announcement of the 15th Annual Reunion of the Veteran Steamboatmen's Association of the West, to be held at Champoeg Park on Sunday, June 30, presents some very interesting data on the steamer Eliza Anderson. This old ship, whose keel was laid in Portland in 1857, was the largest low-pressure vessel built in Oregon. She took 18 months to build, after which she began a career of money-making never equaled in the annals of shipping.

The fare from Olympia to Victoria was $20, and $15 from Seattle. Freight on cattle was $15 per head, sheep $2.50, other freight $5 and $10 per ton. What with brisk traveling, the old steamer piled up a monthly profit of many thousands of dollars.

First serious opposition came from the steamer Enterprise, but only lasted for six months. Then the Anderson was alone again, maintaining the rates she had set. Several other competitors followed the Enterprise, but one by one disappeared. In 1870 the Anderson was relieved by a new ship, but emerged from obscurity in 1882 by sinking at the Seattle wharf. She was overhauled and put into service on several runs, lasting through the Klondike gold rush of 1897 and 1898, when men went to sea in anything that would float. On her first expedition to Dutch Harbor, which turned out to be a very hazardous voyage, the Anderson reached that port in a badly battered condition, and was unable to proceed further. She remained at her dock there until carried away from her moorings and stranded on the beach, which finished the career of this spectacular ship.

It has been said that more men were connected with the ship than with any of the other early steamboats, to which the announcement's listing bears testimony.

Mariners Club of California

News of the Month

TURF-TOSSERS VIE!

Those of us who pointed the old compass toward Millbrae Golf and Country Club on Thursday, May 16, can look back on a grand day! The attraction was the Annual Golf Tournament of The Mariners Club which **Russ Pratt** and his committee served up with all the trimmings . . . including prizes galore, locker-room post-mortems and a swell banquet topping it all off!

Speaking of prizes — there were honors for practically every golfer! Eddie Martin copped the low net with an amazing 66.

There was plenty of good fellowship around the festive board with impromptu entertainment aiding and abetting Russ' hired music.

The Winners

Here are the lucky ones:

1.	Ed Martin	92-26-66
2.	Charles Dilke	78- 9-69
3.	Les Moody	82-13-69
4.	Frank Lewis	91-22-69
5.	Gene Essner	91-22-69
6.	By Haviside	78- 9-69
7.	Russ Pratt	83-13-70
8.	Millard Hickman	98-27-71
9.	Trev. Smith	81-10-71
10.	Vernon Showell	93-21-72
11.	Don Staples	91-19-72
12.	George Lacey	94-20-74
13.	Louis Siverson	94-20-74
14.	Paul Faulkner	99-21-78
15.	A. J. Campbell	109-27-82

Guest Winners

1.	Harry M. Pforsich	80-14-66
2.	Bill Hammond	88-17-71

Prize donors were as follows:

American Chain Co.
Bethlehem Shipbuilding Corp.
General Electric Company
General Engineering & Dry Dock Co.
General Machinery & Supply Co.
Gilmore Steel & Supply Co.
Haviside Co.
C. J. Hendry Co.
Moore Dry Dock Co.
Niderost & Taber
John A. Roebling's Sons Co. of Calif.
Rutledge Glissman Co.
United Engineering Co.

Congratulations to Russ Pratt for a highly successful event!

MARINERS AHOY!

Luncheon Program Scheduled

The next luncheon meeting will be held on Tuesday, June 11, at the Red Room of the Fairmont Hotel. An exceptional program has been arranged with Commander W. G. Bloom, Superintendent of the Marine Training School at Government Island in Alameda, presenting The Accomplishments and Objectives of the Marine Training School.

Chairman of the Day is Winslow D. Conn. All members are urged to attend!

Come aboard!

New Member

Most recent shipmate to sign on is **E. A. Daniels,** of 844 Folsom Street, San Francisco.

In Memoriam

The passing of Leo Baldwin is mourned by his many friends in The Mariners Club. Over the years Leo gave generously of his golden voice for our enjoyment. He was always a loyal worker for the Club's welfare and all of us are going to miss his friendly smile and handclasp.

Memorial Day Observance

At 10 a. m. on Wednesday, May 29, The Mariners Club joined with San Francisco's Marine Exchange in a ceremony commemorating the men in the local marine field who have passed away during the last year.

Chairman in behalf of our club was Edward Macfarlan.

W. EDGAR MARTIN
Low Net Golfer in Tourney

Dravo Man on Coast

Stationed in the Bay district during the course of the construction of the Navy Yard "floating crane" barge at the plant of Pacific Dry Dock & Repair Co. in Oakland is **George F. Wolfe,** chief estimator, works division of Dravo Corporation, Pittsburgh, Pa.

Mr. Wolfe is on the Coast to represent the Dravo organization in the assembling of this pre-fabricated construction job . . . and to consult with Coast operators interested in similar barge orders. The Dravo people are developing a fine record in the design of such hulls, many of which are being built for specific requirements in accordance with the service for which they are intended.

Mr. Wolfe, an authority on welding processes, is chairman of the Dravo Welding Committee. He is also Chairman of the Pittsburgh section of the American Welding Society. Program chairmen of California sections of the A. W. S.—take note!

News of the Propeller Clubs of the United States

The Port of San Francisco

Tirey L. Ford
President

Frazer A. Bailey
First Vice-President

Charles L. Wheeler
Second Vice-President

Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Charles L. Wheeler

Memorable events during the month of May set high standards of Propeller activities as the Port of San Francisco scheduled three impressive programs.

The sponsoring of the graduation exercises of the California Maritime Academy held in the Gold Ballroom, Fairmont Hotel, on the evening of May third was the first notable endeavor of the month. In attendance were members of the Board of Directors of the Propeller Club, Port of San Francisco . . . of the California Maritime Academy . . . officers of the Schoolship California State, and distinguished guests who contributed to the program of the evening.

A very impressive feature of the program was the award of the Degree of Doctor of Laws to **Roger D. Lapham**, Chairman of the Board of American-Hawaiian Steamship Company . . . which honor was officially bestowed by **Robert H. Fouke**, Chairman of the Board of Governors of the California Maritime Academy.

Edward H. Harms of McCormick Steamship Company officiated as Master of Ceremonies. Introductory remarks were offered by Robert H. Fouke, with additional addresses by E. C. Mausshardt, District Manager, Pacific Coast District, U. S. Maritime Commission, and Mr. Lapham.

Capt. William Fisher, Supervising Inspector, Bureau of Marine Inspection and Navigation, made the presentation of degrees to the graduating cadets and the presentation of awards was conducted by **P. H. Harding**, editor of The Log.

Members of the graduating class were as follows:

GRADUATING CLASS 1940

Deck Cadets—Russel H. Abbott, John Clague, Lawrence E. Davis, Frank V. Foot, Walter M. Fox, Elphege A. Gendreau Jr., Russell Meeker, Raymond W. Racouiliat, J. D. Schulman, R. H. Sonneman, Frederick V. Thompson, Vernon N. Urbani, Frederick J. Welch, Richard B. Wilkie, Jack E. Wilson.

Engineering Cadets — William F. Chapman, Alfred E. Gallant, Jr., Frederick C. Gilchrist, R. H. Greer, Donald M. Haas, Charles H. J. Miller, William J. Peck, Robert C. Puckett, Joseph E. Shreve, Jr., Stanley Smullen, Rawson R. Snyder, William E. Trantum.

National Maritime Day

The second eventful program of the Club's calendar for May was the observance of National Maritime Day in which activity the Port of San Francisco joined with the Foreign Trade Association of San Francisco, The San Francisco Commercial Club and the San Francisco Junior Chamber of Commerce.

Committee for National Maritime Day was comprised by the following: Ernest Draper Howard, Chairman; Philip Coxon, E. J. Macfarlan, Eugene Hoffman, and Edward H. Harms.

Highlight of the occasion was the appearance of Admiral Land before over one thousand of San Francisco's business men . . . notables in maritime and commercial circles . . . at the luncheon held in the main dining room of the Commercial Club. This great audience greeted the inspiring address of our distinguished guest with a rising ovation.

Our First "Formal"

Official reception of Admiral Land by the Propeller Port of San Francisco was the third event of the month in the club's calendar. The Fairmont Hotel was the setting of a delightful dinner-dance, well attended by Propeller members and their ladies . . . with "everyone aboard" having a grand time to the degree that this initial "annual" has established a high

standard for all succeeding yearly formals.

Our guest of honor was introduced by President Tirey L. Ford, who gave the only "speech" of the evening (in fourteen seconds flat!) Admiral Land found the program and its accompanying features an enjoyable climax to a very busy day during which he had very few quiet moments. A press-conference at 9:00 A. M.—at which the Admiral appeared with a punctuality indicative of his Navy training . . . was immediately followed by an inspection tour of all the shipyards on San Francisco Bay engaged in the U. S. M. C. construction. The luncheon-reception at the Commercial Club was followed by a trip on the "Slocum" to The Moore Dry Dock Company's yard in Oakland . . . thence to Treasure Island where our distinguished visitor was officially received by Marshall Dill, president of the Golden Gate International Exposition.

The Port of San Francisco was honored by the presence of Ralph Chandler, president of the Propeller Port of Los Angeles, who airplaned to the Bay district after his club's noon-day observance of National Maritime Day.

Committee in charge of this highly successful program was headed by Bernard DeRochie with Eugene Hoffman, secretary, Edward Harms, W. Edgar Martin, Byron Picard and Captain Lewis Mesherry as stalwart aides.

Secretary Hoffman arranged a colorful program of entertainment with the artists appearing between dance numbers.

Those who attended will long remember this first annual get-together!

Micromax and Speedomax Rayotube Pyrometers, a forty-page catalog (N-33B) issued by Leeds and Northrop Company to show some of the specialized temperature measuring problems to which Rayotube detectors are now being applied.

It pictures Rayotubes in a variety of applications detecting temperatures of work in motion: rod-stock during hot-rolling; work passing through continuous heat-treat furnaces; rails on the rolls. It shows Rayotubes sighting directly on many important surfaces: on the under side of open-hearth roofs; on the lining of rotary kilns; on the retort of spiral-retort furnaces. It shows Rayotubes mounted at forge-furnaces; at continuous ceramic kilns; at beehive kilns; at soaking pits; at open-hearth checker-chambers; and at many other industrial heating units.

Diagrams show the various methods of applying these detectors, and actual-size color reproductions of chart-records illustrate the features of Micromax and Speedomax instruments which Rayotubes now make available to many new applications.

Improved Gasket Maker

The Crane Company, Chicago, has recently effected great improvements on their gasket marker.

This tool is now about 4 inches longer than previously, and is made of rust-proof spring brass, designed as a handy tool for marking and outlining gasket sizes on sheet packing. This new marker eliminates the use of a compass or a pair of dividers and the necessity of referring to gasket tables or the taking of more than one measurement. All necessary information for marking gaskets sizes is etched in raised characters on the device.

It offers a handy, quick and convenient method for marking gaskets for extra heavy, medium, standard and low pressure flanges, both ring and full-face types up to and including the 10" I. D. size. Other advantages claimed are that it saves time and waste of gasket materials. The device is easy to use, and gasket dimensions can be marked quicker by its use than by any other method.

For example: it is necessary to cut a gasket for a 6" pipe, extra heavy flange, ring style. The center of the gasket is located by thrusting a thumb tack or pin through the center hole at bottom of marker. This pins the device to the sheet packing. Then a pencil point is placed through the 6" hole (on center line of marker, representing I. D. of pipe), and a circle is scribed.

The O. D. line of the gasket is found by placing the pencil point in the 6" hole, left hand column, representing ring O. D. for an extra heavy flange, ring style, and scribing a circle.

The gasket is now marked and ready for cutting with knife or shears.

Notable Improvement In Fire Hose

A new line of municipal fire hose announced by the B. F. Goodrich Company and incorporating important improvements should be of interest to maritime users of fire hose.

Greatest single result of the improvements is to provide greatly increased flexibility under all weather conditions without sacrifice of the strength and wearing quality built into the hose.

This has been accomplished through a research program which led to the development of stronger and more compact yarns and water-repellent jacket treatments which do not harden in zero temperatures.

Advantages of increased flexibility are: The hose is much easier to handle when coupling at the hydrant; can be handled quicker and easier on the ladder; is racked in the trucks with less effort and time; and folds closer in racking, permitting more hose to be carried.

"Flame Cleaning and Dehydrating Iron and Steel," an 8-page illustrated booklet, has just been issued by Air Reduction, New York.

The first part of the booklet is devoted to a reprint of a recent magazine article, "Maintenance Painting on the Golden Gate Bridge," written by R. G. Cone, engineer, Golden Gate Bridge and Highway District. The article discusses the various problems encountered in the task of keeping the huge bridge in proper condition, and what means were utilized to overcome these problems. Mr. Cone explains how Airco equipment was employed in flame-cleaning and dehydrating operations.

Rounding out the booklet is the text of a paper delivered by F. H. Frankland, chief engineer, American Institute of Steel Construction, at the annual meeting of the American Toll Bridge Association. In his message, entitled "The Cleaning and Painting of Bridge Steel," Mr. Frankland discusses the economy of efficient maintenance of steel structures, and the important part played by flame cleaning in this program.

Copies of this booklet, ADG-1073, may be obtained on request.

Port of Tacoma

The March dinner and meeting of the Propeller Club, Port of Tacoma, was held on Wednesday evening, May 22, at the Tacoma Club. This meeting was changed from our regular Tuesday meeting date in order that we might hold it on National Maritime Day, May 22.

Immediately following a very fine dinner, guests in attendance were introduced to the Club, after which **Pres. Moore** reported the signing of a new member for our Club in the person of **J. M. Martinac** of the Martinac Shipbuilding Corp.

Next in order was the drawing of the names of lucky winners in the ticket raffle which was held for the benefit of the Sea Scout Schooner Albatross. The lucky winners were **John Olson** of the Olson Tugboat Company and **Marsh Davis** of the Pacific Forest Industries.

The main feature of the evening was the address by **Captain Isak Lystad,** Master of the S.S. North Star, who carried out an important assignment in the recent expedition to "Little America" in connection with the U. S. Antarctic Service.

Comments from various members who were present at this meeting indicate that Captain Lystad's talk was the most interesting ever heard at our club meetings. He told very graphically about his trip from Seattle to Boston where he supervised the loading of the North Star and of the trip from there to the South Pole via New Zealand, and of the unloading of the supplies at the two bases at "Little America." He also described his trip back to Seattle.

After the Captain's address, many questions were asked him by the listeners, after which the meeting was adjourned.

CHAS C. CRAMP,
Secretary.

A-E Appointment

WILLIAM H. SCHULTZE

The American Engineering Company of Philadelphia, manufacturers of Marine Deck Auxiliaries, Hele-Shaw Pumps, Lo-Hed Hoists and Taylor Stokers, announces the appointment of **W. H. Schultze** as sales manager of the Marine Division.

Mr. Schultze has been associated with the American Engineering Company for the past twenty years where he has held positions in the employment, purchasing and sales departments.

Before his association with the American Engineering Company, Mr. Schultze was connected with several manufacturing companies among which were J. L. Mott Company, John A. Roebling Sons Company, and the Merchants Shipbuilding Corp. He served in the U. S. Navy during the World War.

Factory Representative

The International Paint Company are announcing the appointment of **Capt. Gus Lambert** as their general factory representative for the Sales Department.

His knowledge and long experience will be utilized to formulate products to meet the exacting requirements of yachtsmen. Interlux Enamels, Super Spar Varnish, No-skid Deck Paint and other yacht products will be under Capt. Lambert's active supervision.

American Mail Line Appoints A. R. Lintner

From Seattle comes word that **Lawrence C. Calvert,** president of American Mail Lines, Ltd., announced the appointment of **A. R Lintner** as general manager of the reorganized company. Mr. Lintner, widely-known shipping executive of the Pacific Coast, brings to his new post an experience embracing the Northwest and the Orient, and is very conversant with problems of transpacific trade and shipping.

Previously headquartered at Portland, Mr. Lintner has gone to Seattle to assume his duties with AML. In the former city, he was general manager of the Pacific-Atlantic Steamship Company and the States Steamship Company.

He was born in New York City in 1893, graduated from college, and began securing experience in engineering, after which he joined the construction department of the Navy. Subsequently he was connected with shipbuilding, and in 1917 moved to Seattle to join the technical staff of the Seattle Construction & Dry Dock Company. When war broke out in 1918, his long association with the U. S. Shipping Board began in Seattle as head of the technical section, and in 1922 he went with its ship operating department as executive assistant to the Northern Pacific district director. At the end of five years in this capacity, promotion came as a result of his qualification for a higher post, and Mr. Lintner was made district director.

Resigning from the Board in 1929, after 11 years' service, he went with the States Steamship Company in Portland, immediately being sent to Kobe to take charge of that office. Six years later he was appointed Seattle manager, and in 1937 was promoted to the post of general manager of that company and the Pacific-Atlantic Steamship Company in Portland.

Book Reviews

Marine Diesel Engine Standards: 145 pages, 6" x 9", illustrated with 29 diagrams and charts, edited by M. J. Reed and Otis A. Sibley and published by Diesel Engine Manufacturers' Association; price, $2.00 net.

This is a carefully-prepared, well-printed and nicely-bound book, published to meet the need of an authentic American reference on the subject. Provision of a somewhat standardized terminology should minimize confusion and misunderstanding. The Association greatly desires constructive criticism of this their first published volume, to the end that each succeeding edition may more nearly attain perfection.

The book is composed of 14 chapters, a glossary of abbreviations and a very complete index. The chapters include such topics as:

Marine Diesels in Foreign and Domestic Commerce; Standard Performances, Equipment, Definitions; Design and Construction; Classification and Marine Inspection; Application in Ships; Application in Dredges; Fuel for Marine Diesels; Foundations and Seatings; Propellers and Torsional Vibrations; Starting Systems; Cooling Systems; Fuel Systems; Lubricating Systems and Intake and Exhaust Systems.

The treatment of all of these subjects in the space allotted must obviously be suggestive rather than conclusive. Every naval architect, marine engineer and ship operator should have this book and should give it careful study.

"1000 *Ways to Make* $1000"; 478 pages, 6" x 8½", with many illustrations; bound in silver cloth with blue stampings; edited by F. C. Minaker and published by The Dartnell Corporation; price, $2.50 net.

This is a very interesting compilation of brief accounts of methods whereby individuals turned spare time into cash by commercializing their hobbies, starting new ideas in service, building up small business on the side, selling in spare time, inventing, or promoting direct mail orders.

The present volume is a third revised and enlarged edition of a book first sold in 1936.

Methods range from "Starting a Stamp Exchange" to "Raising Siamese Fighting Fish" or "Providing Meals for Pet Dogs."

An interesting and helpful book that might prove a very profitable study for seagoing personnel. Even in the old days of the 12-hour day afloat, many sailors found leisure to pursue hobbies. Today both officers and sailors have ample leisure time at sea, which might be pleasurably and profitably employed.

Lloyd's Register of American Yachts, published by Lloyd's Register, New York, N. Y. Price $12 in canvas, $14 in blue cloth.

The 38th annual edition of *Lloyd's Register of American Yachts* will contain particulars of over 7,200 yachts within the United States and Canada, the largest number ever listed. An interesting contrast is made by comparing the new issue with the first American Yacht Register, that of Edward Fox in 1872, then a booklet of 55 pages, listing 401 yachts and 24 clubs.

Approximately 60 per cent of the new boats launched since the publication of the last edition are power craft, a class which is finding increasing favor with many new converts to yachting in its less exciting but perhaps more pleasurable form.

The transfer of many of the great power yachts to Canadian registry will perhaps be especially noticed by many who have long been accustomed to the appearance of these vessels in American waters.

Absence of any additions to the racing yachts, not only of the America's Cup Class but in the medium sizes, is also worthy of attention, with no yachts racing under the Universal (Herreshoff) and none building for this service.

Included among the new power yachts is Fifer, 104' 6" overall, built by the Burrard Dry Dock Company, Ltd., for Captain W. M. Crawford of Vancouver, fitted with twin diesel engines. Most of the remaining 40 per cent of new boats launched are auxiliaries, the largest being Vigilant, a ketch 93' 10" on the waterline, designed by Eldredge-McInnis, Inc., built for Drayton Cochran of New York by Shelburne Shipbuilders, Ltd., of Shelburne, N. S.

With an increase of 64 yacht clubs and associations over that previously recorded, the need that has arisen for additional mooring and landing facilities seems to be obvious, and burgees of most of the new clubs are reproduced this year.

Reflection on the rapidly-increasing interest in yachting would seem to emphasize the usefulness of the Yacht Register, containing not only specific information for reference purposes on yachts and yachting organizations, but also 70 flag plates, including private signals and burgees in colors.

Handbook on Slings. This latest publication by the Macwhyte Company was written specially for use by safety men, superintendents, engineers, purchasing agents and all others concerned with handling problems (where slings are employed). Containing 56 pages of information, the handbook includes many reference tables and photographs.

Latest information on sling designs, capacity and weight comparisons of slings, wire rope and chain; tables for safe working loads; typical assemblies; crane signals; breaking strength and weight comparisons—these are typical of the information contained in the handbook.

Copies may be had by simply writing, on company letterhead, giving name and title and mentioning *Pacific Marine Review*, to Macwhyte Company, Kenosha, Wisconsin.

Handbook of Signals, a group of five cards, bound by spiral wire, imprinted in four colors, compiled by Captain R. E. Dobie; price, $1.00.

This is a very handy compilation of the essential information for deck officers of the American Merchant Marine in acquiring a working knowledge of flag, manual, blinker and semaphore signaling and signal reading.

Captain Dobie operates a navigation and engineering school in San Francisco to prepare candidates for license and raise of grade examinations. He has prepared this book especially to cover the present demand that American Merchant Marine officers become more familiar with standard signaling at sea.

News of "The Bilge Club"

By William A. Mason
Lieut. Commander, U. S. Navy
(Retired)

BILGE CLUB HOLDS ANNUAL MEETING

The Bilge Club held its annual meeting of the membership at the California Yacht Club, Wilmington, Cal., on Tuesday evening, May 7, for the purpose of transaction of necessary business and the election of a new board of directors for the ensuing year.

The report of the Secretary and the Treasurer indicated a healthy growth during the year just completed. Membership showed a net gain of 25 over the preceding year and a comfortable balance was reported in the treasury.

As a result of the elections, Lloyd Moore of the General Petroleum Corporation will head the Club as its new President and Chairman of the Board. Moore is a veteran officer of the Club, having previously served as its Secretary and as a member of the Board. He succeeds Dan Dobler, of the Texas Oil Company.

Other officers elected were: Board members—Dan Dobler, Texas Oil Company; John R. Eidom, Hancock Oil Company; Fred G. Archbold, Lloyd's Register of Shipping, all of whom were members of last year's Board, and the additional new members:

Captain T. W. Peters, marine superintendent of the Standard Oil Company; James Craig, Craig Shipbuilding and Dry Dock Company; E. R. Nelson, Los Angeles Shipbuilding Company.

Other officers elected by the Board of Directors were: Secretary, Floyd Nelson, Texas Oil Company; Treasurer, E. J. McKee, Western Natural Gasolene Corporation.

A tentative date for the Eleventh Annual Barbecue and Golf Tournament has been set for Saturday, June 29, at the Palos Verdes Golf Club.

BILGE CLUB PREPARES FOR ANNUAL BARBECUE

At a meeting of the Elks Club in San Pedro Chairman Lloyd Moore and his Board of Directors laid plans for the forthcoming Eleventh Annual Barbecue and Golf Tournament. This event will be held at the Palos Verdes Golf Club on Saturday, June 29.

The following members were appointed on the general committee:

W. H. Wickersham, honorary general chairman

Lloyd J. Moore, general chairman

J. M. Costello, assistant general chairman

J. Malseed, chairman of tournament

J. M. Costello, chairman of tug-of-war

G. C. Cable, chairman of tennis

E. R. Nelson, chairman of program

John Eidom, chairman of baseball

Hal Bowen, chairman of prizes

Daniel Dobler, chairman of barbecue

W. A. Mason, chairman of publicity

Al Drew, chairman of entertainment

Ed Hanay, chairman of handicaps (official starter)

W. S. Rash, chairman of horseshoes

James Craig, chairman of rules

Frank Cavanaugh, chairman of grounds

T. W. Peters, chairman of attendance

F. G. Archbold, chairman of reception

Floyd Nelson and E. J. McKee, at gate.

The chairmen of the various general committees were instructed to name additional members of their various committees.

Captain McDowell

Captain C. S. McDowell (U.S.N. Retired), widely known shipbuilding consultant with Consolidated Steel Corporation, Maywood, California, has made arrangements (effective May 1) whereby he will no longer be actively associated with that concern, allowing more time for his interest in furthering Southern California shipbuilding and other national defense engineering projects.

Captain McDowell's widely heralded accomplishment in negotiating a 4-ship $7,800,000 shipbuilding contract for Consolidated Steel, signaled the revival of shipbuilding in Southern California, previously dead more than 20 years.

Recognized nationally as a major engineering project organizer and as a shipbuilding expert, Captain McDowell, previous to associating with Consolidated, was supervising engineer in charge of designing, construction and erection of the world's largest (200 inch) telescope on Palomar Mountain, San Diego County, California. Because of the national defense as well as scientific value of that project he was loaned by the U. S. Navy to the Rockefeller Foundation for that assignment.

George J. Robinson

George J. Robinson, 70, former president of Robins Dry Dock & Repair Co., Erie Basin, Brooklyn, and a member of the board of directors of Todd Shipyards Corporation, died May 21 at St. Peter's Hospital, Brooklyn.

Mr. Robinson, long prominent and a colorful figure in the shipping industry of the nation, started his career as an ironworker at the age of 14 with the firm of Handren & Robins, predecessor organization of the John N. Robins Company, which in turn became the Robins Dry Dock & Repair Company.

Except for a four year interval during which he worked at the Brooklyn Navy Yard, Mr. Robinson devoted all his services to the Robins Company until his retirement in 1925.

Steady As You Go!

(Continued from Page 45)

The owner, charterer, agent, master or other licensed officer of any vessel involved in a marine casualty or accident shall retain the voyage records of the vessel, including both rough and smooth deck and engine room logs, bell books, navigation charts, navigator's work book, compass deviation cards, stowage diagrams, records of draft, aids to mariners, radiograms sent and received and the radio log and crew's and passenger's list, which upon request shall be produced for the inspection of the board or its agent whenever required.

If the director shall find that such licensed officer or holder of certificate of service or efficiency is incompetent or has been guilty of misbehavior, negligence or unskillfulness, or has endangered life, or has willfully violated any of the provisions of this title or any of the regulations issued thereunder, or any other law or regulation providing for safety at sea, he shall, in a written order reciting said findings, suspend or revoke the license or certificate of service or efficiency of the holder of such certificate.

Any person whose license or certificate of service or efficiency is suspended or revoked may within thirty days appeal from the order of the said director to the Secretary of Commerce. On such appeal, the appellant shall be allowed to be represented by counsel. The Secretary of Commerce may alter or modify any finding of the Board which conducted the investigation, or of the director of the Bureau of Marine Inspection and Navigation, but the decision of the Secretary of Commerce shall be based solely on the testimony received by the said Board, and shall recite the findings of fact on which it is based.

QUESTION

What is the law concerning death from negligence, misconduct, etc.?

ANSWER

Every captain, engineer, pilot or other person employed on any steamboat or vessel, by whose misconduct, negligence or inattention to his duties on such vessel the life of any person is destroyed, and every owner, charterer, inspector or other public officer, through whose fraud, neglect, connivance, misconduct or violation of law the life of any person is destroyed, shall be fined not more than $10,000, or imprisoned not more than ten years, or both: Provided, That when the owner or charterer of any steamboat or vessel shall be a corporation, any executive officer of such corporation, for the time being actually charged with the control and management of the operation, equipment or navigation of such steamboat or vessel, who knowingly and willfully caused or allowed such fraud, neglect, connivance, misconduct or violation of law by which the life of any person is destroyed, shall be fined not more than $10,000, or imprisoned not more than ten years, or both.

Whenever the death of a person shall be caused by wrongful act, neglect or default occurring on the high seas beyond a marine league from the shore of any State, or the District of Columbia, or the Territories or dependencies of the United States, the personal representative of the decedent may maintain a suit of damages in the district courts of the United States, in admiralty, for the exclusive benefit of the decedent's wife, husband, parent, child or dependent relative against the vessel, person or corporation which would have been liable if death had not ensued.

QUESTION

What is the penalty for willful breach of duty; drunkenness?

ANSWER

Any master of, or any seaman or apprentice belonging to, any merchant vessel who, by willful breach of duty, or by reason of drunkenness, does any act tending to the immediate loss or destruction of, or serious damage to, such vessel, or tending immediately to endanger the life or limb of any person belonging to or on board of such vessel; or who, by willful breach of duty, or by neglect of duty, or by reason of drunkenness, refuses or omits to do any lawful act proper and requisite to be done by him for preserving such vessel from immediate loss, destruction or serious damage, or for preserving any person belonging to or on board of such ship from immediate danger to life or limb, shall, for every such offense, be deemed guilty of a misdemeanor, punishable by imprisonment for not more than twelve months.

QUESTION

What is the law concerning submarine cables?

ANSWER

The master of any vessel which, while engaged in laying or repairing submarine cables, shall fail to observe the rules concerning signals that have been or shall hereafter be adopted by the parties to the convention with a view to preventing collisions at sea; or the master of any vessel that, perceiving, or being able to perceive, the said signals displayed upon a vessel engaged in repairing a cable, shall not withdraw to or keep a distance of at least one nautical mile; or the master of any vessel that, seeing or being able to see, buoys intended to mark the position of a cable when being laid or when out of order or broken, shall not keep a distance of at least a quarter of a nautical mile, shall be guilty of a misdemeanor, and on conviction thereof, shall be liable to imprisonment for a term not exceeding one month, or to a fine of not exceeding $500.

Any person who through negligence breaks or injures a submarine cable shall be liable to a fine of $500, or imprisonment of three months, or both.

Any person who shall willfully break or injure a submarine cable shall be guilty of a misdemeanor, and liable to a fine of $5,000, or imprisonment not exceeding two years, or both.

Your Problems Answered

(Continued from Page 43)

could fabricate the top half of the section flat with bottom half as shown, and the load at **B** would be the same. This is obvious, because if the lower half loaded points **B** heavier than the flat upper half, due to the greater surface of the lower half, there would be a tremendous force downward due to this differential loading. We know that the downward force is not changed by the shape of a pressure vessel.

Hence the total load due to pressure is $B + B = PD$, but $\frac{D}{2} = R$ and load at one point is $B = \frac{PD}{2}$, hence load **B** at one point is $\frac{PD}{2} = P\frac{D}{2} = PR$.

The strength of the metal at this point is the tensile strength **S** x the area. The area is 1″ x thickness **T**.

Area = **T**.

Strength of section is **ST**.

If we adjust the pressure **P** upwards until the metal breaks, we would make the load at **B** equal to the strength at this point, or $PR = ST$, from which $P = \frac{ST}{R}$.

This is a very important relation to remember, because we will recognize it in all the formulas of General Rules and Regulations involving a cylinder or pipe. Memorize this formula and you will find all others only modifications and adjustments.

We must reduce the pressure **P** below the maximum by a factor **F**. That is, **W** must be $\frac{1}{F} \times P$.

Also, we must multiply **P** by a decimal or percentage expressing the fact that the riveted joint is always slightly weaker than the parent metal. This efficiency factor **E** is added into the formula as $W = P \times E$.

Combining both **E** and **F** into the general formula, we have $W = \frac{STE}{RF}$. (See second footnote.)

Our next article will discuss the four different values of **E**, representing the four possibilities of failure of the riveted joint. Also a study of the loading in the metal in a longitudinal direction, showing that it will always be only half the loading in a circumferential direction and need not be studied in calculating **W**.

Engineers' Licenses for April

Name and Grade	Class	Condition
JUNEAU		
A. W. Nelson, 3d Asst.	MS, any GT	RG
HONOLULU		
C. R. Collins, 1st Asst.	SS, any GT	RG
SEATTLE		
E. D. Barker, Chief	MS, any GT	O
P. J. Byrne, Chief	MS, any GT	O
H. A. McLoskey, 2nd Asst.	SS, any GT	RG
F. Z. Rogers, 3d Asst.	SS, any GT	O
PORTLAND		
G. P. Thorberg, 1st Asst.	MS, 1200 GT	O
3d Asst.	MS, any GT	
SAN PEDRO		
A. Coleman, Chief	SS, 400 GT MS, 750 GT	RG
J. P. Zimmerman, 3d Asst.	SS, any GT	O
C. Hanken, Chief	MS, 750 GT	O
SAN FRANCISCO		
W. H. Baldwin, Chief	SS, any GT	RG
H. I. Salley, Chief	SS, any GT	RG
A. G. Sorlom, Chief	SS, any GT	RG
J. Van der Dussen, Chief	SS, any GT	RG
B. Rousseau, Chief	SS, any GT	RG
D. Buchanan, Jr., 1st Asst.	SS, any GT	RG
Chief	MS, any GT	O
G. N. Rutherford, 1st Asst.	SS, any GT	RG
Chief	MS, any GT	
E. C. Sandstrom, 2nd Asst.	SS, any GT	O
D. E. Buchanan, 2nd Asst.	SS, any GT	RG
W. L. Whitson, 2nd Asst.	SS, any GT	RG
J. W. Beam, 2nd Asst.	SS, any GT	RG
J. Holliday, Chief	MS, any GT	O
W. J. Jenders, Chief	MS, any GT	O
C. E. Adair, Chief	MS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

Balanced Action Diaphragm Packless Valves

A new line offered by the Henry Valve Company, Chicago, is a diaphragm packless valve series with a "balancing-action" that assures positive valve opening under all pressure conditions.

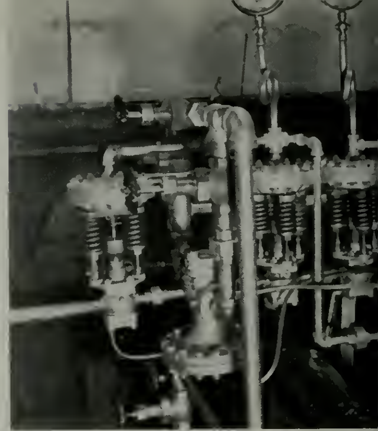
Diaphragm packless valves offer the only hermetic seal for volatile gases and liquids. Their value lies in the fact that they have no stem packing, and consequently this source of leaks is eliminated. The diaphragms furnish a perfect seal whether the valve is open or closed. Since a leaky valve may be a fire hazard, an expense and a menace to health, packless valves are recommended for refrigeration gases, cooking and heating gases, gasoline and other fluids which are dangerous and hard to handle.

The "Balanced-Action" valve attacks the problem in a straightforward manner. In these valves, pressures above and below the seat are equalized at the instant of opening. To accomplish this, a balancing channel is provided through the axis of the stem. When the valve is closed, the top port of this channel is sealed by contact with the bottom diaphragm, a positive metal-to-metal seal. When the handwheel is turned to open the valve, the diaphragms, because of pressure beneath them and their own snap action, rise and expose the upper port of the balancing channel. The high pressure above the seat is instantly released through the channel to the lower pressure area below the seat, equalizing the pressures and allowing the valve to open easily.

Since this design permits the use of a very light spring, the diaphragm will be subjected to less wear. Also a non-rotating floating bearing plate is used in the upper stem. Instead of the stem itself, this plate bears on the diaphragm, eliminating torsional wear and strain. Diaphragm life has been further lengthened by the unique construction of the diaphragm assembly. There are four laminated diaphragms: the top of phosphor bronze to minimize wear, the bottom of stainless steel to guard against corrosion, while the center laminations are of a special soft bronze to provide a self-sealing action, making the diaphragm assembly puncture-and-fracture-proof.

The new valves are more compact in design and lighter in weight, and are made in all standard types, 2 way, 3-way and angle, in the following size range: Flare fittings, ¼″ to ⅝″; solder connections, ¼″ O.D. to 1⅛″ O.D.; male pipe thread, ¼″ to 1″.

A Novel Pilot - Controlled Fuel Pump Regulator



Pilot-controlled pump regulator on S. S. Harry Luckenbach.

Installation of a specially-designed pilot-controlled fuel oil pump regulator on the freighter Harry Luckenbach was recently made by Staples & Pfeiffer, Ltd., of San Francisco. The installation in the steam line to the oil pump of the main pump regulator with three pilot valves, as shown in the photograph, gave full regulation of the fuel oil pump, resulting in automatic boiler steam control.

As this is a new and original application, a full description is given here of its operation. This regulation controls the variation of the oil supply to the burners in accordance with the steam demands. The oil pressure is automatically varied with set low fire and high fire adjustable limits in accordance with changes in the steam pressure. Only the exact amount of oil necessary to maintain the desired steam is supplied to the burners.

The usual practice has been to employ a pump governor on the steam line to the pump with the oil discharge connected to the diaphragm head, to hold a steady oil pressure. Adjustment of this pressure would be manual to suit steam requirements. This has many good features and holds a fairly steady steam pressure, but is automatic only in holding steady oil pressures. The new application is the opposite of this.

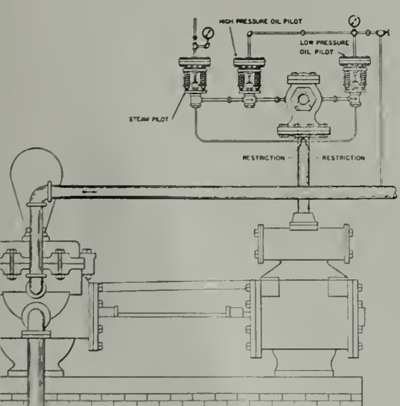


Diagram showing arrangement of three pilots

A steam-actuated pilot valve is connected to the diaphragm chamber of the main valve, with special bleed port connections to the outlet side. Two extra pilot valves are employed, one controlling the low atomizing oil pressures set at 100 lbs. minimum so that fires will not be extinguished, and the other acting as a high oil pressure controller to meet peak steam requirements. Once these two oil pilots are set, no further adjustment is necessary, since they act as safety pilots for low and high fire conditions only.

The main steam pilot is the real controlling element, acting on the slightest change of initial main steam pressure, and increasing or decreasing the pressure on the balanced diaphragm of the main valve which controls the fuel oil pumps.

Main steam pressure is kept constant regardless of steam demands through the smooth and steady operation of the single-seated steam pilot valve. The main valve and all pilot valves are of cast steel construction with packless stainless steel valve trim for resistance to wear, and diaphragm troubles are eliminated by the flexible control.

A slight increase or decrease of the steady fuel oil pump pressure controls the mechanical atomizing oil burners, which in turn control the main steam pressure and keeps it constant.

The same principle can be applied: to control forced-draft fan engines; to control oil temperatures; and to protect oil heaters from carbonizing through the positive closing off of valves, especially when coming into port and maneuvering.

Following is a record of the performance of these valves while at sea, as compiled by Mark Strosk, chief engineer of the Harry Luckenbach:

Readings taken at four-hour intervals on run between San Francisco and San Pedro. R.p.m. at main engines, 110.6 average for run to San Pedro. Pump size, 7½" x 5" x 6", horizontal duplex type. Stroke per minute, 30.

The pump steam pressures show the range of the main valve action. Burner and pump oil pressures show requirements to hold constant steam pressure.

This complete equipment was furnished by Staples & Pfeiffer, Ltd., including the special Spence regulators and pilot valves. Installation was by the ship's engineering personnel, under Staples & Pfeiffer's supervision.

Initial Steam Pressure	*Pump Steam Pressure*	*Burner and Oil Pressure*	*Pump Oil Pressure*	*High Oil Pilot, Set Pressure*	*Low Oil Pilot, Set Pressure*
265 lbs.	180 lbs.	230 lbs. to	220 lbs.	300 lbs.	100 lbs.
265 lbs.	170 lbs.	220 lbs. to	215 lbs.	300 lbs.	100 lbs.
265 lbs.	160 lbs.	220 lbs. to	210 lbs.	300 lbs.	100 lbs.
265 lbs.	150 lbs.	215 lbs. to	200 lbs.	300 lbs.	100 lbs.

Record of performance, S. S. Harry Luckenbach.

Building in American Yards

Direct Reports from Yards as of May 1, 1940.

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Keel for first ship laid January 19, 1940.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 20' x 60' steel gasoline barge for U. S. Engineers, Bonneville, Ore. Completion about July 1, 1940.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 55-foot ketch-rig yacht.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Schiller Street
Alameda, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Tugs Sea Giant and Despatch No. 6, Tahoe, Solano, Kadiak, Dump Barge No. 16, Shawnee, Dredge San Pedro, El Aquario, Delarof, Sequoia.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION:

Democracy, purse seine fishing boat for Anton Kursar and partners; length 92', breadth 24', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 320 H.P.; 10 knots speed; cost $75,000. Launched April 1, 1940; **delivery date May 20, 1940.**

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners: length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 H.P.; 10 knots speed; cost $160,000. Delivery date October, 1940.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Canco, Cornelia, Manzinata, Boxer, 14 cannery boats, Alaska Pacific Packing Co. fleet, Norco.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Yacht Volador, Nyholt, Yacht Haida, Velma, Cascade, S. O. Barge No. 7, Yacht Happy Days, Hallanger, Dagmar Salen, H. D. Collier.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939. Keel laid, No. Y044, April 1, 1940.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6", SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195 launched September 15, 1939; No. 196 launched December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6". Keel laid, No. 197, February 5, 1940.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Keel laid January 3, 1939.

Monssen (DD436); keel laid July 12, 1939.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10); keel laid October 27, 1939.

Biscayne (AVP11); keel laid October 27, 1939.

Ships authorized, work not started: Casco (AVP12), and Mackinac (AVP13).

SEATTLE-TACOMA SHIPBUILDING CORP.
1801-16th Ave., Southwest
Seattle, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. Keel laying dates, March 5, April 15, August 26, September 26, 1940, and February 26, 1941. Launching dates, August 1, September 1, 1940, and February 1, March 1, July 1, 1941. Delivery dates, January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Dorothy Luckenbach, U.S.C.G.C. Haida, Alaska, Clevedon, F. J. Luckenbach, Cordova, Derblay, Indra, Denali, Heian Maru, Barge DL No. 33, Harry Luckenbach, Jacob Luckenbach, Susan V. Luckenbach, Chetzemoka, Stag Hound, Tanana, North Wind.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, Western Pacific, bait boat for tuna fishing for Western Pacific Co., San Diego, Calif.; 100' x 26'; 350-H.P. Superior engine. Delivery date, July 1, 1940.

Hull No. 142, St. Francis, purse seine fishing boat for Hubert Ursich, Tacoma, Wash.; 93' x 24'; 380-H.P. Enterprise engine. Delivery date, July 1, 1940.

Hull No. 143, purse seine fishing boat for Spiro Babich, Gig Harbor, Wash.; 95' x 25'; 400-H.P. Atlas engine. **Launching date, June 1, 1940.**

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels

for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H P. engines. Keel laying dates, February 5, February 19, July 1, November 10, 1940; and March 1, 1941. Launching dates, July 30, August 31, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Twenty coal barges 175′ x 26′ x 11′ for Carnegie-Illinois Steel Co.

Three oil barges 240′ x 50′ x 12′ for Campbell Transportation Co., Pittsburgh, Pa.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423 and DD424, two 1620-ton destroyers for U. S. Navy. Delivery dates August and October, 1940, respectively.

Hulls Nos. 180-181, DD429 and DD430; two 1620 ton destroyers for U. S. Navy. Delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437 and DD438, two 1620-ton destroyers for U. S. Navy. Delivery dates, June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy.

Hull No. 1477, Express, cargo vessel for American Export Lines, Inc.; 450′ B.P. x 66′ x 42′ 3″; 16½ knots speed, geared turbines and water tube boilers; 14,500 tons. Launched March 9, 1940. **Delivered April 18, 1940.**

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S. Navy.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450′ B.P. x 66′ x 42′ 3″; 16½ knots; geared turbines and water tube boilers: 14,500 tons.

Hulls Nos. 1485-1487, three tankers 502′ x 68′ x 37′; 21,000 tons.

Hulls Nos. 1488-1491, four tankers for Sinclair Navigation Co.; 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Navigation Co.: 15,450 tons dwt.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4330, Esso Annapolis; and 4331, Esso Albany; two 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Launching dates, No. 4330, September 9, 1939; No. 4331, April 27, 1940.

Hulls Nos. 4337, Delbrasil; No. 4338, Delorleans; and No. 4339, Delargentino; three passenger and cargo ships for Mississippi Shipping Co. Launching dates, No. 4337, December 16, 1939; No. 4338, February 17, 1940. **Delivery dates, No. 4337, June 1, 1940;** No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hull No. 4349, Esso Augusta, tanker for Standard Oil Co. of N. J. 13,000 tons dwt.; 13 knots. **Launching date June 15, 1940.**

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417′ 9″, breadth 60′ 0″, depth 37′ 5″. Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

One steel tug 100′ x 25′ x 12′; 805 H.P. Fairbanks-Morse engine. **Delivered.**

One wooden deck scow 118′ x 36′ x 10′ for builder's account. **Delivery date, May 29, 1940.**

Two steel tugs 90′ x 23′ x 10′; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery dates August and September, 1940.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170′. **Delivery date, June, 1940.**

Hull No. 167, sub-chaser PC-452, length 174′, for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1572, one welded flush deck cargo box barge 130′ x 30′ x 7′ 6″ for stock; 250 gross tons.

Hulls Nos. 1627-1628, two welded steel coal barges, 134′ x 34′ x 17′, for stock; 1534 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hulls Nos. 1655-1656, two welded steel carfloats 330′ x 40′ x 11′ for Long Island RR, Philadelphia, Pa.; 2606 gross tons.

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135′ x 26′ x 8′ for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80′ x 30′ x 9′ for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250′ x 34′ x 9′ 1″ for Pennsylvania R.R.; 5940 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 943 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135′ x 27′ x 11′ 9″ for Semet Solvay Company, 290 gross tons.

Hull No. 1717, one welded steel derrick boat hull 100′ x 36′ x 7′ for Anthony O'Boyle, Inc., N. Y. C.; 220 gross tons.

Hulls Nos. 1718-1724, seven welded steel gasoline barges 195′ x 35′ x 9′ 6″ for Campbell Transportation Co., Pittsburgh, Pa.; 3976 gross tons.

Hulls Nos. 1726-1735, ten type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hull No. 1736, one welded steel oil fuel storage barge for Brooklyn Edison Co.; 375 gross tons.

Hulls Nos. 1737-1739, three welded steel oil barges, 195′ x 35′ x 9′ 9″, for stock; 598 gross tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Launched March 9, 1940.

Hulls Nos. 163, Frederick Lykes; 164, Doctor Lykes; 165, Almeria Lykes; 166 and 167; five C-3 cargo vessels for U. S. Maritime Commission. No. 166 keel laid March 4, 1940. Launching dates, No. 163, February 24, 1940; No. 164, April 6, 1940; No. 165, April 27, 1940. **No. 163 delivered.**

Hulls Nos. 168-169, two 6000 ton cruisers for U. S. Navy.

Hulls Nos. 170-171, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission. Keel laid, No. 172, January 22, 1940.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J. Keels laid December 26, 1939; **launched May 25, 1940.**

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo ships for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co.; 13,000 dwt. tons.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo

vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. Delivery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 271, ferryboat for Police Jury, Parish of Plaquemines, Pointe-A-La-Hache, La.: 105′ x 35′ x 5′. **Completion date, May 15, 1940.**

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147′ x 35′ x 7′ 6″. Estimated completion date, August 1, 1940.

Hulls Nos. 275-276, two oil barges, 93′ x 36′ x 10′ 6″, for Panama Canal, Washington, D. C. **Delivered.**

Hull No. 277, derrick barge 80′ x 38′ x 6′ for Doullut & Ewin, New Orleans, La. **Estimated completion date May 15, 1940.**

Hull No. 278, mooring barge 100′ x 30′ x 5′ for Standard Oil Co. of Ind., Chicago, Ill. **Estimated completion date May 12, 1940.**

Two oil barges, 195′ x 35′ x 9′ 9″, for Ashland Oil Co. **Completion date, May 25, 1940.**

One oil barge, 195′ x 35′ x 9′ 9″, for C. J. King, Dothan, Ala. **Completion date, June 1, 1940.**

One oil barge, 225′ x 35′ x 10′ 0″, for Standard Oil Co. of Kentucky. Completion date, July 22, 1940.

Six sand and gravel barges, 110′ x 26′ x 6′ 6″, for Tennessee Valley Sand and Gravel Co. **Completion date, June 1, 1940.**

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

Four all-welded unmanned barges 173′ x 39′ x 8′ 6″ for Pan American Refining Co. **Delivery date May, 1940.**

One steel single-screw diesel tugboat 70′ x 19′ x 8′ for Pan American Refining Co.; 450 B.H.P. **Delivery date May, 1940.**

One electric ferry 185′ 2½″ x 55′ x 15′ 6″ for Electric Ferries, Inc. Powered with 950-H.P. General Motors diesel with one 750-H.P. propelling motor. **Delivery date, May, 1940.**

Two all-welded unmanned barges 173′ x 39′ x 8′ 6″, for Higman Towing Co., Orange, Texas. **Delivery date, May, 1940.**

One all-welded steel tugboat 48′ x 12′ 3″ x 6′ 2″ for Atlantic, Gulf & Pacific Company, N. Y.; 165 H.P. **Delivery date May, 1940.**

One all-welded steel tugboat 57′ 7″ x 14′ x 7′ 6″ for Atlantic, Gulf & Pacific Co., N. Y.: 240 H.P. **Delivery date May, 1940.**

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406′ x 57′ x 23.5′. Approximate dates, launching date, September 15, 1940; delivery date, January 4, 1941.

One steel twin screw diesel towboat, 140′ x 35′ x 8′ 6″. Delivery date, November, 1940.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

China Arrow.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, America, twin screw mail, passenger and cargo liner for United States Lines Co.: length 723′, beam 92′, depth 45′. Launched August 31, 1939; delivery date, July 2, 1940.

Hulls Nos. 370, 371 and 372, three oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525′, breadth molded 75′, depth molded 39′. Keel laid, No. 372, February 5, 1940. Launching dates, No. 370, September 29, 1939; No. 371, January 26, 1940. **No. 370 delivered April 20, 1940.**

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″, gross tonnage about 9100 tons. Keels laid, No. 380, November 13, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940. **Estimated launching date, No. 379, June 7, 1940.**

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465′, breadth 69′ 6″, depth 42′ 6″; gross tonnage about 9100 tons.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. Length 465′, breadth 69′ 6″, depth 42′ 6″; gross tonnage about 7,700.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. Length 435′, breadth 63′, depth 40′ 6″; gross tonnage about 8,000.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

One destroyer tender for U. S. Navy. Launched May, 1939; **delivered.**

One seaplane tender for U. S. Navy; launched April, 1940.

One destroyer tender for U. S. Navy. Launched December 9, 1939.

One seaplane tender for U. S. Navy; order placed October 14, 1938.

One battleship for U. S. Navy. Keel laid July, 1939.

One repair ship for U. S. Navy; order placed July 20, 1939.

Two cruisers for U. S. Navy; order placed March, 1940.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp; 1600 gross tons; 300′ x 65′ x 20′; steam UnaFlow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. Launching date August 1, 1940; delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413′ x 60′ x 37′ 6″; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Launching date November 1, 1940; delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95′ 6″ x 24′ x 14′ 9″; steam Una-Flow propulsion; 600 H.P.; 13-knots speed; cost $200,000 each. **Launching date May 21, 1940; delivery date June, 1940.**

Hull No. 1079, tug for Long Island R.R. Co.; 105′ x 24′ x 12′ 11″; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. Launching date October 15, 1940; delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206′ x 65′ x 16′; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Launching date December, 1940; delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hull No. 185, one single-screw diesel cargo vessel for U. S. Maritime Commission, C-3 design. Equipped with Busch Sulzer engines. **Delivery date, May, 1940.**

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates April, May, June and July, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. **Delivery date, June, 1940.**

Hulls Nos. 191-192, two single screw steam turbine railroad car carriers for Seatrain Lines, Inc. **Delivery dates, May 15 and June 25, 1940.**

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date March, 1941.

Hull No. 194, one tanker for Atlantic Refining Co.; 19,400 tons. Delivery date July 10, 1940.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 1,800 tons. Delivery dates March and June, 1941.

Hull No. 196, one tanker for Sun Oil Co.; 1,800 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered. Launching dates, No. 33, October 31, 1939; No. 34, January 10, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons.

PACIFIC MARINE REVIEW

JULY
1940

NEW S.S. DELBRASIL ENTERING THE BEAUTIFUL HARBOR, RIO DE JANEIRO

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

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J. S. Hines, President and Publisher — B. N. DeRochie, Assistant Publisher — Paul Faulkner, Advertising Manager — Alexander J. Dickie, Editor — F. Dryden Moore, Assistant Editor

There's No Slipping Hazard in the Galley *on this Modern Tanker*

WHEN the "ESSO BOSTON" and several sister ships were built for the Standard Oil Company of New Jersey by the Federal Shipbuilding & Dry Dock Company, walking safety was assured in the galleys by Alundum Floor Tile. Spilled liquids cause no slipping hazard, for even when wet this tile gives a firm, sure footing. And it will never wear smooth and slippery in the spots where traffic is concentrated. Catalog A gives full information.

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Alundum Tiles, Treads & Aggregates

T-470

CRAIG SHIPBUILDING COMPANY

LONG BEACH, CALIFORNIA

Builders and Repairers of Steel and Wooden Ships

**Drydock Capacity
2500 Tons**

VOLUME 37
No. 7

PACIFIC MARINE REVIEW

JULY
1940

A Stimulating Record

In his report of May 15, outlining to his Board of Governors the activities of the first four months of 1940, Almon E. Roth, president, graphically summarizes as follows the constructive work of the San Francisco Employers' Council.

During the period covered by the report, the records shows that the Council has:

Served 1,423 firms, employing 28,899 persons, in matters affecting employer-employee relations;

Settled amicably without losses to employers or employees a total of 48 controversies;

Completed 26 collective labor agreements, and handled 45 collective negotiations involving 551 firms and 8,330 employees; and

Sponsored 565 meetings with employer and employee representatives, most of which were held in the offices of the Council.

During the four-month period, there were seven strikes held in San Francisco, in only two of which was the Council concerned as negotiating agent prior to the strike.

The Council began its work on February 20, 1939. Since that time it has successfully negotiated or has now under process of negotiation 128 collective agreements, and has amicably settled through negotiation, adjustment or arbitration, 195 controversies.

This is a very inspiring record of cooperation in industry, and reflects great credit on the Employers' Council and on its chief executive.

New Naval Construction

As we go to press, definite word comes of allocations of several Navy jobs to Pacific Coast yards in addition to the contracts listed in our *On the Ways* and *Building in American Yards* sections.

On June 29 Mare Island was awarded four submarines under the Navy expansion program authorized by the Vinson Act. On the same day, two destroyers were awarded to the San Francisco plant of the Shipbuilding Division of the Bethlehem Steel Company.

Undoubtedly also Puget Sound Navy Yard was awarded its share of the huge program allocated to private yards and Navy yards on June 29. The total private yard negotiated price awards let by the U. S. Navy on that date include the ships listed below.

Naval Construction Allotted June 29

Electric Boat	13	submarines	at	$ 2,790,000	$36,270,000
Bethlehem Fore River	4	cruisers	at	23,618,000	94,472,000
Do.	4	cruisers	at	18,573,000	74,292,000
Bethlehem Staten Island	2	destroyers	at	7,431,000	14,862,000
Bethlehem San Francisco	2	destroyers	at	5,977,000	11,954,000
New York Shipbuilding Corp.	3	cruisers	at	18,657,800	55,973,400
Do.	1	seaplane tender			14,260,500
Federal Shipbuilding & Dry Dock Co.	6	destroyers	at	7,159,700	42,938,200
Do.	2	destroyers	at	8,500,000	17,000,000
Do.	2	destroyers	at	5,277,000	10,554,000
Bath Iron Works	6	destroyers	at	6,813,200	40,879,200
					$383,455,300

TOTALS: 11 cruisers, 13 submarines, 1 seaplane tender, 20 destroyers.

Privilege is Responsibility

Coast Guard Graduates Hear Some Plain, Old-Fashioned Truth

To the nineteen young men graduates of the 1940 class of the United States Coast Guard Academy at New London, Connecticut, came some brave and true words from Herbert E. Gaston as they listened to his "charge" on their acceptance of commissions in the Coast Guard Service. Mr. Gaston is Assistant Secretary of the Treasury.

In view of the present world situation, this address becomes in a very real sense a "charge" to every American citizen, and deserves a much larger audience than the 19 graduates and the friends gathered to do them honor.

As published in the *Coast Guard Bulletin,* Mr. Gaston's address follows:

If I could give you any gift at all, it would be the gift of a certain way of thinking about your commission in the service of the United States as an officer of the Coast Guard. I would have you think of it, not as a debt to any one or to many, not as a responsibility hanging as a dead weight around your neck, but as a glorious opportunity, a break, the friendly pat on the shoulder that says to you, "Get in there now, and do your stuff."

You will reject automatically the notion that now you have made the grade and you can rest on your oars and live a life of ease and some honor as a sort of pensioner of the public. You will reject it because you will know instinctively that there's nothing to it; that that way of life just isn't any good, or any fun, that it has no satisfaction in it, that it is no life for a man.

Instead, you will want to do a bang-up good job on every assignment and every detail you have; you will want to reflect on how you could have done it better.

Men and Ships Exacting Masters

You will have responsibility for ships, which are machines, and for men. Both of them are exacting masters. It may seem strange to you that I speak of the men who will work under you rather than your superior officers as your future masters. Those who have known responsibility for the lives and welfare of men know what I mean.

You will command men. You will command them under a form of military discipline. That discipline exists for no other reason than that it is the best system that has been found for doing an exacting job well, because the job itself creates and demands discipline. The higher you rise, the more stern the discipline which the job imposes. You were not selected for command because of any assumed social superiority, but through a searching system of examination and training to fit you for command. You have the opportunity to prove that no mistake was made.

The Coast Guard, more than any other Service, typifies the soul and character of the American nation and the American people through its combination of virtues molded into a benevolent organization of

The United States Coast Guard operates one of the largest fleets in America. They have:

35 cruising cutters
117 patrol boats
42 lightships
65 lighthouse tenders
52 harbor craft
4 training vessels
4 special craft
a total of 319 vessels.

A cruising cutter, U. S. Coast Guard.

strength and courage devoted to the service of mankind.

There is a different doctrine at large in the world today. It is that nations need recognize no code of honor, no duty that strength owes to weakness, no right of free men to live a life of freedom, but that might is the only law which men should respect and that it is a law of nature that might should trample and beat down all that stands in its path. This, we are told, is the principle and the law by which nations exist.

Just to say that we are Americans is enough to say that we reject that doctrine utterly, that we reject it with scorn, with contempt, and with pity. It is repudiated by our history, by the life of every man who has served our country nobly in peace and every man who has died gallantly for our country in war. It is a denial of civilization, a denial of every step of man's progress from the cave and the jungle. It is a doctrine of men turned beasts.

I speak of this because it has an application to your careers. You are to follow the ways of peace in protecting men's liberties and protecting men's lives. But you are to be prepared also to protect them in the sterner test of war if war should ever become necessary to defend America's existence and America's way of life against an alien tyranny.

In that again, if it should befall you, you will typify the spirit of our Nation, which seeks peace and pursues with determination the benevolent and constructive way of peace, but has the will and the strength to meet any aggressor who would challenge our liberties.

Always Prepared

You have a motto which means "always prepared." I hope that each of you will take it as a personal motto for himself. Neither ships nor people are ever prepared by accident for what is to come. It is always by intention and by work. The extent to which the Coast Guard is always prepared will depend always on the extent to which each one of you and each one of your shipmates is prepared for any task that he may have to perform. Initiative is and always must be a most highly valued quality in any military service as well as in any civilian service—and that's something that we must never forget. Initiative comes from the individual. It is a part of individual thinking and individual character. We want unity of action —yes. We want a well integrated organization. But integration and unity themselves are products of the thinking of individual men. We act in concert, but we think alone.

In this respect, the aims of our Service are again typical of the aims of our democracy, which gives freedom to the individual to think and to speak with freedom and without duress—even to criticize harshly existing institutions, existing ways of doing things, so that the brains of all may be utilized to promote progress. There is no aristrocracy, no system of caste or rank in the intellectual world, except the aristocracy and the rank created by the fact that some men are willing and able to think more effectively and more fruitfully than others. And those who are able in this respect are able largely because they have been willing to undertake the labor and the hardships of thinking and learning.

Get Your Thinking Straight

This thought leads me to revert to the theme on which I touched a moment ago. It is very much in my mind, and I think in yours, because it contains a compulsion—a terrible compulsion—upon us, to get our thinking straight.

We have seen and are seeing unity of action make of dictatorships a menace to all the world. We need not think the menace must always be confined to another world and that it does not threaten us. It does threaten us, from within if not from without; and I am inclined to think that the most subtle and therefore the most dangerous aspect of the threat is the danger that we Americans might be persuaded that the ways of democracy are of necessity weak and ineffective for their own defense and that they must give way to the methods of dictatorship, that we must sacrifice freedom of thinking to get unity of action.

The record of history teaches no such lesson. It teaches quite the contrary. Humanity has progressed where there has been freedom to think, freedom to exchange ideas, freedom to progress. These modern forms of military totalitarian dictatorships are using the arts of civilization to lay waste civilization. The very weapons that they turn against peaceful peoples were forged in the laboratories and the studies of peaceful and freedom-loving people. Virtually every atom of scientific knowledge that makes these war machines frightful was stolen from the minds and hands of peaceful men working in intellectual and physical freedom for the advancement of mankind. These menacing monsters are not the ultimate fruit of civilization. They are foul parasites on the body of civilization, drawing their strength from the accomplishments that men of peace have wrought.

They are a new thing in this modern world. They are but a few years old. No matter how black the situation may look today, we have no reason and no right to think that they will conquer and corrupt the world to their system. We have every reason in the light of history to believe that they will be crushed or will fall of their own weight. Nature will not accept the domination of brute force. If that were true, man would never have existed. How can any system which throttles thought endure or live long? Must it not perish in its time, as any other parasite must perish?

Let us have unity, but not without freedom. Let us protect freedom through the concert of action of free men. Let us be prepared.

For all that may come of opportunity to build the greatest of joys and satisfactions, which is work well done and work done in the interest of human welfare and human progress—not in the interest of hate or tyranny—may each of you always be prepared—and may God go with you.

Sea Arrow stack.

(Photo by Bird)

Sea Arrow—

First Pacific Coast

Moore Dry Dock Company First High - Pressure Built in a Pacific

In Pacific Coast shipbuilding circles, June, 1940, is a notable month marked with the name Moore. In that month the Moore Dry Dock Company launched a large cargo vessel, laid the keel for another, and held the trial trip of a third. These vessels are U. S. Maritime Commission C-3, geared turbine drive, shelter deck type cargo carriers, of which a fourth is in the water at Moore's outfitting dock having machinery and equipment installed.

The three vessels of this group that are already launched were christened Sea Arrow, Sea Star and Sea Panther. Pictures illustrating this article were all taken on the Sea Arrow, and show very nicely the remarkably fine workmanship and finish of that vessel. Sea Arrow is a Number One ship in several respects:

(1) She is the first vessel of the U. S. Maritime Commission program to be built on the Pacific Coast.

(2) She has the first high pressure marine steam power plant to be installed on the Pacific Coast.

(3) She is the first large cargo vessel built on the Pacific Coast with over half the joints in the hull welded.

(4) She is the first large merchant vessel built in a Pacific Coast yard to be equipped with all the modern American safety requirements and fireproof construction.

These facts, coupled with the long famine of new construction in Pacific Coast shipbuilding plants, have caused a great deal of interest in the progress of the Sea Arrow. Would the shipyard be able to get skilled workers? Would these workers be able to master the new shipbuilding technique? Would Pacific Coast marine mechanics be able to install high-pressure steam systems satisfactorily? Would the first plant be full of "bugs," and so put a black

(Photo by Moulin)

S. S. Sea Arrow on her preliminary trials on San Francisco Bay.

C-3 Delivered

Holds Successful Trials on Steam Cargo Carrier Coast Shipyard

Bow view at outfitting pier.

(Photo by Moulin)

eye on future contract prospects? These and a hundred more questions were in many minds and not a few mouths. They are now very satisfactorily answered in a finished ship, and a more beautifully finished ship than Sea Arrow would be hard to find.

On her trials she was pretty well loaded with experts. The official trial board from the Maritime Commission and their large corps of observers. The guarantee engineers and installation men of the machinery and equipment manufacturers. The shipyard trial crew. All hard-boiled, technical, and little given to verbal bouquets. But everywhere one heard praise of the workmanship; remarks on the interest taken by mechanics; comment on the rather remarkable circumstance that during the dock trial just one small gasket blew, and the full vacuum on both main and auxiliary condensers was obtained with no adjustments on the first attempt.

As we go to press, word comes that Sea Arrow has gone well above her required speed on trials, and has earned a bonus by keeping well below her guaranteed fuel consumption rate.

We congratulate the Moore Dry Dock Company and all of those who have worked with them to produce this beautiful ship and these excellent results.

Characteristics of Sea Arrow are shown in table herewith. In general she is a single-screw steel cargo vessel of the shelter deck type, with raked stem and cruiser stern, driven by geared steam turbines. Her total displacement at 28 feet 7½ inches mean draft is 17,600 tons, and breaks down into: light weight of hull and machinery, 5680 tons; and total deadweight carrying capacity, 11,920 tons. The total deadweight includes: fuel oil capacity, 1629 tons; fresh water capacity, 70 tons; distilled water capacity, 14 tons; boiler feed water capacity, 314 tons; crew, stores and effects, 33 tons; and deadweight cargo capacity, approximately 9860 tons.

Seven watertight bulkheads di-

Principal Characteristics

Length overall	492′—0″
Length between perpendiculars	465′—0″
Beam molded	69′—6″
Depth molded, shelter deck	42′—6″
Depth molded, freeboard deck	33′—6″
Draft, loaded	28′—7½″
Full load displacement (approx.)	17,600 tons
Gross measurement (approx.)	7,680 tons
Net measurement (approx.)	4,550 tons
Light weight of vessel	5,680 tons
Total deadweight capacity	11,920 tons
Cargo deadweight at 28′—7½″ draft	9,860 tons
Propulsion power, normal	8,500 shp
Propulsion power, maximum	10,625 shp
Sustained sea speed	16½ knots
Cruising radius at 16½ knots	12,000 miles
Normal crew	43
Passenger capacity	12

vide the hull into eight compartments. From bow to stern these are: the fore peak: hold No. 1, with hatch opening 20′ 0″ x 36′ 0″, and with 105,593 cu. ft. capacity: hold No. 2, with hatchway 24′ 0″ x 30′ 0″, and with 134,141 cu. ft. capacity: hold No. 3, with hatchway 24′ 0″ x 37′ 6″, and 180,642 cu. ft.; the engine room or machinery space; hold No. 4, with hatchway 24′ 0″ x 30′ 0″, and 142,860 cu. ft.; hold No. 5 with hatchway 24′ 0″ x 40′ 0″, and 110,853 cu. ft.; and the after peak.

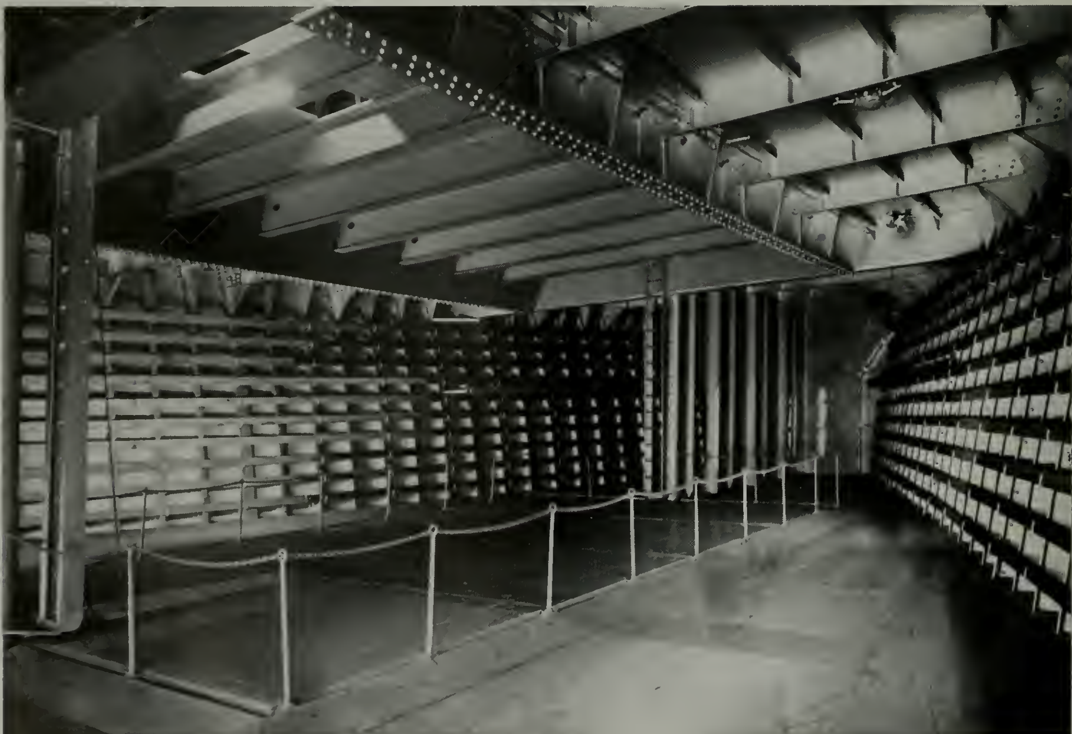
In tween deck spaces over the machinery compartment there is an additional dry cargo capacity of 12,276 cu. ft. No provision is made in this design for refrigerated cargo. In holds No. 2 and No. 5, oil-tight deep tanks are installed for liquid cargo in bulk. The two tanks under No. 2 hold have a combined capacity for 1500 tons, and the tank under No. 5 hold will take 270 tons.

Perishable ship's stores are kept in refrigeration chambers on the shelter deck amidships, where they are readily accessible to the galley. There are six of these chambers, of the following capacities and specified temperature ranges: meat room, 1180 cu. ft., 22°-26° F.; vegetable room, 1180 cu. ft., 35°-40° F.; dairy room, 260 cu. ft., 40°-50° F.; thawing room, 370 cu. ft., 40°-50°F.; ice room, 200 cu. ft., 20° F.; and fish room, 260 cu. ft., 20° F. All of these conditions are maintained by a direct expansion system installed by the York Ice Machinery Corporation, using Freon 12 refrigerant and served by a York 4″ x 4″ compressor driven by a 7.5-hp Westinghouse motor.

Hatch Covers and Cargo Handling

On the shelter deck, all hatch covers are the Tutin type, of welded steel box section construction. These covers span the entire width of the hatch, and are self-supporting without strong backs. Two jacks with wheeled base lift each section clear and roll it to the end of hatch, where the covers are stowed while cargo is being worked. With the aid of these jacks, two men, one on each side of hatch, easily handle these large steel covers. The stowage of this type of hatch cover leaves the deck perfectly clear for cargo handling operations. All the tween deck hatches are fitted with standard hatch boards and strong backs.

There are five sets of king posts, fitted with 16 five-ton and one 30-ton cargo booms served by 16 American Engineering Co. winches. The booms and king posts are of tubular steel, and were supplied by the Columbia Steel Co. These winches are of the single-drum type, with drums 22″ in diameter and 20 inches long, and with a single 18-inch gypsy head on the drum shaft extension. They are driven by 50-hp General Electric waterproof motors, and are designed to handle 3720 pounds at a speed of 330 fpm, and 7450 lbs. at



(Photo by Moulin.)

An unusual high lighted photograph of the lower tween deck space in Hold No. 1, showing details of construction and equipment.

Cargo gear, hatch covers, king posts, booms, houses, and winches in systematic, streamlined arrangement on shelter deck, looking forward from bridge.

(Photo by Bird.)

pumps which actuate the rams operating the rudder are installed in duplicate, each pump being driven by a 50-hp General Electric motor. This gear will swing the rudder from hard over to hard over in 30 seconds when the ship is going 18 knots.

The rudder is of the contraguide type, and, together with the stern post, provides a contrapropeller that is designed to greatly increase propulsive efficiency.

The deck views indicate the complete elimination of the standard ventilating cowl. In these ships all ventilation is mechanical, and is maintained by American Blower Corp. Sirocco fans driven by Diehl motors. For ventilation of cargo holds, the fans are located in the deck erections between the king posts.

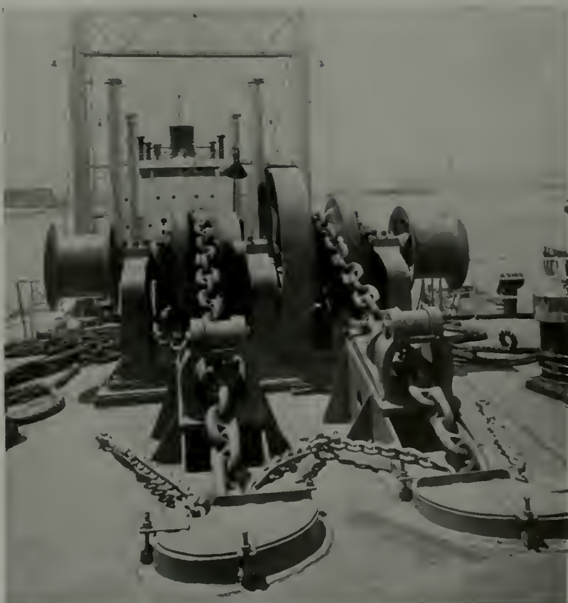
All of the rooms for officers, crew and passengers in the amidships deck house are served by an air conditioning installation located in the after end of house on boat deck. A Flexitube Aerofin unit for heating or cooling and controlling humidity of the air is served by two Sirocco fans driven by Diehl motors operated under Cutler Hammer controls. The combined ca-

250 fpm. Two units are fitted with double gearing, and will lift 14,430 lbs. at 105 fpm. As will be noted in the deck views herewith, the winches are all installed on the shelter deck directly in line with the king posts. The operating control stand is inboard of winches and practically on fore and aft center line of the ship. All resistors in connection with winch control are installed inside the deck erections between each pair of king posts.

The windlass, furnished by the American Engineering Company, is of the horizontal spur gear type driven by a 70-hp General Electric motor, and will lift the two 10,640-pound Baldt anchors simultaneously from a depth of 30 fathoms at a speed of 30 fpm. Naco cast steel stud link anchor chain is used.

An American Engineering 24" capstan of the reversible type, located aft on the shelter deck, is driven through a vertical shaft by reduction gear, worm drive, and 50-hp General Electric motor installed on the second deck. This capstan will exert a 29,000-lb. pull at a rope speed of 30 fpm.

Steering equipment is modern and very complete. The steering engine is the well-known American Engineering Company electro-hydraulic unit, arranged to be controlled from the wheel house either by hydraulic telemotor for manual steering, or by the Sperry gyro pilot control for automatic course keeping. Direct manual control is arranged from a station aft on the shelter deck or from a trick wheel in the steering engine room. The hydraulic



American Engineering Co. anchor windlass and Naco anchor chain, forecastle of Sea Arrow.

(Photo by Bird.)

Pipe and conduit installation in shelter deck passage.
(Photo by Bird.)

pacity of the fans is 9410 cu. ft. of air per minute.

Satisfactory conditions are maintained in galleys, toilets and bathrooms by an exhaust mechanical ventilation system.

Officers, passengers and crew are all housed in the midship deck erection. The rooms are all of fireproof construction and the furnishings are of incombustible materials. Every man in the crew has a good berth, an individual locker, hot and cold water piped to room, ample bath and sanitary facilities. The bulkhead and ceiling panels in all rooms are of Johns-Manville Marinite, metal faced, and painted in pleasing combinations.

Four large staterooms, each with private bathroom, provide very comfortable accommodations for 12 passengers.

A large, electrically-equipped galley, and two pantries, serve the various messrooms. The galley ranges, bake ovens, bain marie, and other electric equipment was furnished by the Edison General Electric Appliance Company. All joiner work in the accommodations was furnished by Hopeman Bros. of New York.

The locations of quarters are: deck and engine room crew, galley, galley stores, crew's mess, petty officers' mess, and hospital, on shelter deck; deck and engine room officers' rooms, officers' pantry, officers' mess and lounge, cadet's rooms and junior officers' rooms, on cabin deck; captain's quarters, passenger staterooms, radio room, radio operator's room, gyro room, room for air conditioning unit, and lobby, on boat deck; wheel house, chart room and games deck, on bridge deck.

Navigating and Safety Equipment

Most modern and very complete navigating and safety equipment is provided on this vessel.

Kearfott double sash pilot house windows with Kearfott motor-drive window wiper are installed for the enclosed portion of bridge.

A Sperry Mark IV master gyro controls repeaters on the flying bridge, in the wheel house, in the chart room. A Sperry gyro pilot takes charge whenever automatic course-keeping is desired. A Sperry course recorder keeps a continuous record of the actual courses taken by the ship.

A Bendix-Cory rudder angle indicator shows the exact position and motion of the rudder to the navigating officer. Bendix-Cory mechanical engine room telegraphs faithfully transmit orders from the bridge to the operating platform in the engine room.

A Bendix-Cory general alarm system enables the officer on the bridge to rally the entire crew in an emergency. A Bendix automatic system controls the whistle for signal purposes.

A Fathometer echo sounding instrument supplied by the Submarine Signal Company enables the navigating officer to have a practically continuous indication of the water depth under the ship's keel.

The ship's radio equipment is described in a separate article.

A Lietz rotary resilient brake electrically-driven sounding machine, manufactured by the A. Lietz Company of San Francisco, is installed under the port side wing bridge on the boat deck.

A Crouse-Hinds docking spotlight is mounted at each end of the bridge, and a Westinghouse searchlight is installed on the flying bridge.

The Richaudio smoke detection system, furnished by Walter Kidde & Company Inc., covers every cargo space. It continuously samples air from each of these spaces, and should any air sample show smoke, an audible alarm will instantly sound, and the officer in charge can promptly apply steam smothering to the space indicated.

Captain's suite, stairway in lobby, officers' mess and lounge. Interiors on Sea Arrow feature simple line and color, combined with very neat workmanship, to produce a comfortable, homey effect.

This all-electric galley, with its stainless steel and Monel trim, its tiled floor, gleaming white walls and fine ventilation, should delight the heart of any seagoing chef.

A battery of Walter Kidde "Lux" carbon dioxide cylinders is installed on the second deck just forward of the machinery space, and is piped to the machinery compartment for protection against oil or grease fires. A two-cylinder Lux hose rack is installed on the boiler flat.

For emergency abandonment of ship, there is provided a pair of 28-foot Welin metallic lifeboats, each of which hangs from Welin Crescent davits, one on each side of boat deck. The two boats have ample capacity to take care of entire complement of ship's crew and passengers. These boats are fitted with screw propellers operated by manual gear. An 18-foot Welin metallic workboat is also provided.

Machinery Installation

In general, the power plant of the Sea Arrow comprises a pair of water tube marine boilers supplying steam to a cross compound turbine which drives the single propeller shaft through double reduction gearing. The entire plant is in one compartment. the boilers being mounted aft of and above the turbine reduction gears. All controls are centralized at an operating platform on the forward bulkhead of the machinery space, so that an engineer on watch there has a complete view of both turbines and boilers.

Steam for all purposes on Sea Arrow is provided by two "D" type Foster Wheeler marine water tube steam generators, each of which has a normal capacity of 37,500 pounds of steam per hour at 465 psi pressure and 765° F. temperature. Under maximum load, each unit has a steaming capacity of 56,250 pph.

The steaming unit consists of a 42-inch-diameter steam drum, connected through vertical groups of water tubes to a water drum directly below it. A furnace is built at one side of the tube bank and completely water-cooled by means of closely-spaced tubes. forming the front, rear and side walls, as well as roof. These tubes discharge into the steam drum and are connected into the main boiler circulation through a system of tubes, below the floor of the furnace, leading from the water drum to headers at the bottom of the water walls. The floor tubes are covered with high-temperature refractory, which forms the floor of the furnace. Each furnace is fired with three Todd Variable Capacity oil burners arranged in a vertical row, and the resulting high, narrow sheet of flame affords maximum opportunity for radiation of heat to the water walls of the furnace and to the first rows of tubes in the boiler tank.

Gases leaving the furnace pass through three rows of widely-spaced vertical 2" boiler tubes, which prevent slagging and reduce gas temperatures moderately before the superheater is reached. Beyond the superheater, a vertical baffle deflects the gases up-

Spaciousness, convenient arrangement of equipment and broad range of vision characterize the wheel house on Sea Arrow.

ward to the top of the last bank of vertical boiler tubes. The gas flow is then downward through the 14 rows of $1\frac{1}{4}$-inch tubes to the economizer entrance, and then upward through the economizer and the air preheater to the stack.

The economizer is made up of 2" seamless drawn steel tubes upon which are shrunk gilled ring castings. Combustion air makes two passes through the preheater tubes, and then flows directly to the burners through a short duct built into the face of the boiler casing. Forced draft is furnished by two motor driven Sturtevant blowers.

These boilers as installed on Sea Arrow are held in a rigid frame and heavily insulated throughout. Over the insulation is a substantial steel casing of removable panels. Each boiler is fitted with 11 Vulcan automatic mechanical soot blowers. Stack temperature of gases is approximately 275° F. The two generators are set back to back athwartship so that their uptakes are both directly below the stack.

Wager smoke indicators are installed, and Masoneilan combustion control with Hall feed water treatment.

This steam generating equipment supplies steam to the propulsion turbine at throttle pressure of 440 psi and throttle total temperature of 740° F. The turbine is a De Laval Steam Turbine Company unit with a normal rating of 8500 shaft horsepower delivered to the propeller shaft at 85 rpm. The turbine unit comprises: one high-pressure turbine of 11 stages; one low-pressure turbine of 7 stages; and one double reduction gear connected to the turbines through flexible mechanical couplings. When the propeller shaft is turning 85 rpm, the high-pressure turbine rotor revolves 5012 rpm, and the low-pressure rotor 3459 rpm. An astern element of 3 stages is built into the low-pressure casing.

The propeller is a solid four-bladed bronze wheel 21 feet 7 inches in diameter and having a pitch of 21 feet, 6 inches. This wheel was cast by the Doran Company of Seattle.

From the low-pressure turbine casing, steam exhausts into a Worthington condenser of the two-pass marine type, having a cooling surface of 7800 sq. ft. and a capacity rating of 53,700 lbs. per hour at 28½ inches vacuum and 75° F. injection pressure with cooling water velocity at 7.23 feet per second and 85 per cent clean tubes. This condenser had no difficulty exceeding its guaranteed vacuum on the full power and overload trials of Sea Arrow.

The main condenser is served by Worthington complete air ejector unit with inter and after condensers, and by Worthington vertical centrifugal circulating and condensate pumps driven by Westinghouse motors. The condensate feedwater goes through four stages of heating before entering the economizer:

First it is used as a cooler for the drainage from feedwater heaters, and absorbs enough heat to raise its temperature from 92° F. to 98.3° F.; then it goes to a Davis "Paracoil" heater, which uses 8-pound steam and raises the feed from 98.3° to 168° F.; then to a Worthington deaerating feedwater heater, which is installed well up in the engine room casing and is supplied with bled steam at 25 pounds, increasing the feed temperature to 240° F.; and thence to a Davis Engineering Co. heater that uses steam at 100 pounds and raises the feed temperature to 310° F. The Worthington deaerating heater has a surge capacity of 645 gallons, and acts as the closed hot well of the system.

A Davis evaporator is installed to supplement the make-up feed supply.

The main feed pump is a Worthington 4.5 by 8-inch triplex single-acting plunger type driven through gearing by a 75-hp Westinghouse motor.

All of the general service pumps are Worthington centrifugal vertical shaft type driven by Westinghouse motors.

The lubricating oil system for the turbine bearings, gears and gear bearings is of the gravity type. All lubricating oil from the turbines and gears flows to a sump under the gear casing, from which it is pumped up to the lube oil service tanks by either of two De Laval "IMO" pumps driven by 15-hp Westinghouse motors. For conditioning the lubricating oil in this system, there are installed: one Davis lubricating oil heater; two Davis lubricating oil coolers; and a De Laval centrifugal oil purifier.

Since this is the first high-pressure steam marine power plant installed on the Pacific Coast, it is interesting to note that in some of the installation items that are greatly affected by the unusual steam conditions, Pacific Coast firms were ready to serve.

One instance is the Plant Rubber & Asbestos Company. This firm did the job of covering the high-temperature steam lines with "Prasco" high-temperature covering, and of jacketing this covering with asbestos cloth sewed with copper wire. They also supplied and applied all insulation covering for steam exhaust pipes, fire lines, cold storage lines and all other pipes requiring insulation against heat leakage.

The Hercules Equipment & Rubber Co. provided thousands of gaskets and hundreds of pounds of rubber from their manufacturing divisions in San Francisco for use in the construction and the steam plant installations of Sea Arrow and her sister ships.

The Federated Metals Division of the American Smelting & Refining Co. furnished the Selby diesel babbit for the line shaft bearings.

Auxiliary Power Plant

From the above description, it will have been noted that the Sea Arrow has a large load of connected electrical power. As we figure it, this load, including galley and lights, approximates 1700 horsepower.

To carry this load, which, of course, is never in total simultaneous operation, there are installed on the dynamo flat in Sea Arrow's engine room two 300-kw, 120-240-volt turbo-generator sets.

The turbines are De Laval, taking steam at 440 psi and 740° F. total temperature, and each exhausting into a Worthington marine type 2-pass condenser at 28½ inches vacuum. The generators are Crocker Wheeler direct current, three-wire, compound-wound machines. Current from these generating sets is distributed through a dead front switchboard furnished by the I. T. E. Circuit Breaker Co.

For the power and light required in emergency, a diesel generating set is installed on the shelter deck level. This set comprises a 20-horsepower Hill diesel engine directly connected to a 7.5-kw Electro Dynamic generator.

Sea Arrow is the first of four sisters. Three are in the water, and one is fast taking shape on the ways. The successful result of the trials of this first vessel is a demonstration of the skill and efficiency of the organization at the Moore Dry Dock Company, and certainly stamps that firm as being fully abreast of the new technique in modern shipbuilding and worthy of additional contracts in the U. S. Maritime Commission program.

Radio Equipment on Sea Arrow

Radio direction finder in chart room.

All Maritime Commission ships are practically Naval auxiliaries. The equipment of these vessels is selected, inspected and installed with great care. This equipment must measure up not only to the demands of the merchant trades in which the vessel is to be engaged, but also to the demands of Naval requirements if and when the vessel is called into emergency service.

The Radiomarine Corporation of America is therefore justifiably proud that equipment designed and built by them has been chosen by the Maritime Commission to take care of all wireless communication and radio navigation for the fine steamer Sea Arrow, recently completed at the Moore Dry Dock Company's Oakland yard.

The pictures illustrating this article show all the important items of this installation. Dominating the radio room is the Type No. ET 8010A intermediate frequency combination main and emergency transmitter. This transmitter, rated at 200 watts, has an actual output of 310 watts antenna power when discharging into the standard Federal Communications Commission specified antenna having a capacity of 750 mmfd and a resistance of 4 ohms. The frequency range is 375 to 500 kc.

A Type No. ET 8002C 150-watt high frequency transmitter with a range from 5510 to 16,680 kc is also installed, together with the latest type intermediate frequency and high frequency receivers.

This group of instruments as installed on Sea Arrow is calculated to keep the ship in constant communication with either end of any voyage on which she may be called to serve.

A Type A. R. 8600 radio auto alarm is installed, and is so connected that whenever the operator is off duty, certain radio signals will ring alarm bells in the radio room, in the radio operator's room and on the bridge.

For radio navigation, Sea Arrow has the R. M. C. radio direction finder Type A. R. 8707 with controls, and Sperry gyro compass repeater, in the chart room, and directional revolving loop antenna on the flying bridge. The results with this instrument are accurate in finding bearings on the radio beacon signals from lighthouses, and enable safe navigation in fog conditions.

The Maritime Commission has contracted with Radiomarine Corporation of America to supply all radio communication equipment for all the C-1 type vessels on order. This includes 38 vessels, 19 on the Pacific Coast and 19 on the Atlantic and Gulf Coasts.

Above: The radio room, showing complete equipment, except radio alarm, which is shown separately at right.

American

Shipping and Shipbuilding

For a factual, up-to-date commentary on the status of American shipping and shipbuilding, we turn naturally to the monthly Bulletin of the American Bureau of Shipping, from which (June, 1940, issue) are taken the graphs and tables illustrating this article.

Figure 1 shows the employment of the American Merchant Marine fleet as of March 1, 1940. In the three months since this table was compiled, a considerable tonnage of the ships represented therein has been sold foreign, most of it coming from the classifications of "Privately-owned laid-up vessels" and "Coastwise vessels." This table shows that, of the total fleet, approximately 14 per cent is Government owned, 86 per cent is privately owned, 15 per cent is laid up, and 85 per cent is active. Of the Government-owned fleet, 75 per cent is laid up, and of the privately-owned fleet 5½ per cent is designated as idle. It is interesting also to note that in the privately-owned fleet 16 per cent of the cargo-passenger type are idle, 5 per cent of the freighters, and only a little over 2 per cent of the tankers.

The tankers are 100 per cent privately owned. Nearly 90 per cent of these bulk carriers are in coastwise service, 7½ per cent are in nearby foreign trades, and only ½ of one per cent in overseas foreign service.

During the past three months there has been considerable dislocation of these services, and a similar table as of July 1 would probably show great changes, but this table is a fairly normal showing for the American Merchant Marine.

Figure 2 shows in diagram form the growth of American shipbuilding activity during the past 18 months, as measured in number and in gross tonnage of vessels under construction and/or contract. This diagram shows an interesting trend, the tonnage remaining fairly constant from January to August, 1939, and doubling in the September, October, November period, then holding steady for four months until March, 1940, and taking a steep, upward jump from March to June.

It is interesting to note that, whereas the steep rise in the last quarter of 1939 was largely due to Maritime Commission contracts, the jump marking the second quarter of 1940 was chiefly caused by private tanker contracts.

Figure 3 shows the break-down of contracts existing on June 1 as to type of ship and nature of propulsion power. From the standpoint of deep sea tonnage, we are interested only in the cargo, passenger and tanker types,

SUMMARY OF THE
EMPLOYMENT OF AMERICAN STEAM AND MOTOR MERCHANT VESSELS
OF 1,000 GROSS TONS AND OVER AS OF MARCH 31st, 1940
(Does not include Lake or River Tonnage)

Services	*Combination Passenger and Freight*		*Freighters*		*Tankers*		*Total*	
	No.	*Gross Tons*	*No.*	*Gross Tons*	*No.*	*Gross Tons*	*No.*	*Gross Tons*
PRIVATELY OWNED								
Nearby Foreign (a)	26	169,306	51	200,392	30	199,032	107*	568,730
Overseas Foreign	34	360,541	206	1,181,305	2	13,657	242	1,555,503
Coastwise	42	236,326	374	1,678,539	329	2,329,996	745**	4,244,861
Laid Up Vessels	28	150,846	54	161,049	9	62,663	91***	374,558
Total Privately Owned	130	917,019	685	3,221,285	370	2,605,348	1,185	6,743,652
GOVERNMENT OWNED								
Nearby Foreign (a)	3b	30,063	—	—	—	—	3	30,063
Overseas Foreign	3	61,411	31	184,612	—	—	34	246,023
Coastwise	—	—	—	—	—	—	—	—
Govt. Service	—	—	1d	6,211	—	—	1	6,211
Laid Up Vessels	10c	158,636	117	683,933	—	—	127	842,569
Total Government Owned	16	250,110	149	874,756	—	—	165	1,124,866
Total American Fleet	146	1,167,129	834	4,096,041	370	2,605,348	1,350	7,868,518

(a) Nearby includes Canada, Mexico, Central America, West Indies and North Coast South America to and including the Guianas
(b) Panama R. R. Vessels (c) Includes 2 Panama R. R. Vessels
(d) Loaned to War Dept.
Courtesy U. S. Maritime Commission, Division of Research.

Note:-Vessels under 2,000 Gross Tons included:
* 3 Vessels 4,659 Gross Tons
** 44 Vessels 64,721 Gross Tons.
*** 21 Vessels 29,590 Gross Tons.

Fig. 1.

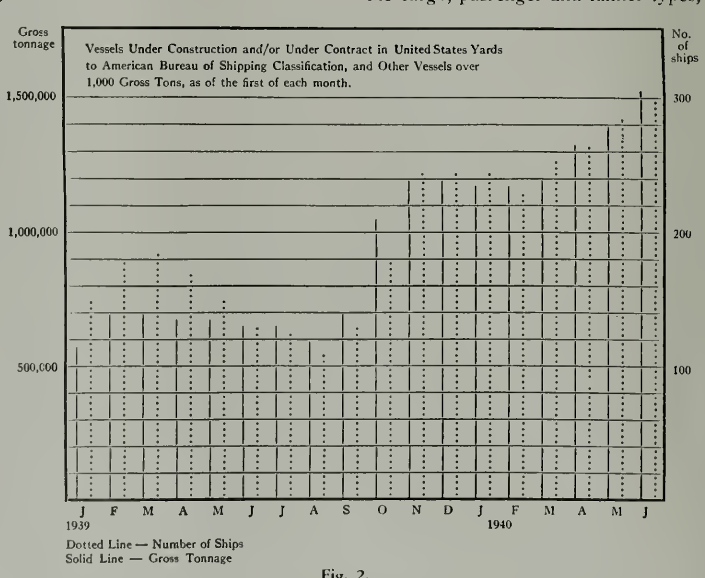


Fig. 2.

RECAPITULATION OF CONSTRUCTION CONTRACTS IN EXISTENCE AS TO TYPE AND PROPELLING POWER

Type	No.	Gross Tons (Est.)	Steam No.	Steam H. P.	Turbo-Electric No.	Turbo-Electric H. P.	Diesel No.	Diesel H. P.	Diesel Electric No.	Diesel Electric H. P.
Cargo	93	680,700	65	394,100	—	—	28	156,000	—	—
Passenger	21	204,300	17	170,500	—	—	4	34,000	—	—
Tanker	63	607,460	51	334,460	2	10,000	10	69,900	—	—
Tug	14	2,440	—	—	—	—	13	7,980	1	1,000
Towboat	14	4,680	1	1,500	—	—	13	11,570	—	—
Ferry	3	5,610	1	3,840	—	—	1	260	1	750
Carferry	1	6,000	1	6,000	—	—	—	—	—	—
Trawler	1	250	—	—	—	—	1	500	—	—
Schooner	1	95	—	—	—	—	1	120	—	—
Oil Barge	38	20,250	—	—	—	—	—	—	—	—
Cargo Barge	15	8,475	—	—	—	—	—	—	—	—
Coal Barge	29	12,430	—	—	—	—	—	—	—	—
Deck Barge	5	965	—	—	—	—	—	—	—	—
Salvage Barge	1	395	—	—	—	—	—	—	—	—
Derrick Barge	1	385	—	—	—	—	—	—	—	—
Totals	300	1,554,435	136	910,400	2	10,000	71	280,330	2	1,750

Self Propelled Vessels — 211 — 1,511,535 gross tons.
Non-propelled Vessels — 89 — 42,900 gross tons.

Fig. 3.

totaling 177 vessels and 1,492,460 gross tons. In these three types the figures indicate that there are now on contract the following percentages of existing tonnage: tankers, 23 per cent; cargo vessels, 16 per cent; passenger vessels, 17 per cent. Considering that 85 per cent of our existing fleet is now considered practically obsolete, these percentages of new construction to existing tonnage seem hardly adequate. This is all the more apparent when we look at the present status of the Maritime Commission program as revealed in Fig. 4.

In the totals column of Fig. 3 we see that the Maritime Commission as of June 1 had contracted with American shipyards to build 156 vessels. The Maritime Commission started a shipbuilding program three years ago calling for 500 merchant vessels in 10 years. The intention at that time was that this program should produce an orderly delivery of 50 ships per year. As of June 1, with practically three years gone out of the 10-year period, there are only 37 ships delivered, 9 more launched and still in builders hands, and keels for 39 more laid in the shipyards of America.

It is very obvious that this Maritime Commission program must be speeded up if we are to add 500 ships to the American Merchant Marine during the 10-year period. To do that, we must finish and deliver 463 ships in the next seven years, or an average of 66 ships a year.

That this program is slower than planned is due to no fault of the U. S. Maritime Commission. It is due rather to public and Congressional apathy towards the program, and to that combination of factors which produce high costs in American shipbuilding. Both of these causes are now losing considerable weight through the impact of world conditions, and we shall very soon see a great demand for speeding up the merchant shipbuilding program, just as we are now witnessing a great demand for the building of all classes of Naval vessels to double our Navy.

The 1937 report of the U. S. Maritime Commission, wherein the present 10-year shipbuilding program was initiated, carefully surveyed the needs of the American Merchant Marine, and came to the conclusion that at least 1,000 vessels would be needed within the next 10 years for commercially necessary replacements of obsolete and fully deteriorated vessels. At the same time, they concluded that such a fleet would be too great an effort financially for the U. S. Government to undertake along with its other responsibilities. In order to put the effort on a national defense basis, they called Navy experts into consultation and determined that the minimum needs for national defense during the next 10 years would be 500 vessels.

At that time not even the most optimistic admiral had any idea of doubling the Navy in four years, as is now proposed. With this doubling of the Navy it will, of course, be necessary to provide a large merchant fleet, and with Congress in its present mood, ready to appropriate billions for Naval shipbuilding, it is entirely reasonable to suppose that many more millions will be appropriated for Merchant Marine auxiliary Naval ships.

This would mean expansion of American shipbuilding plant, and many signs of this are appearing at suitable locations on all our coasts, both in expansion of existing yards and preparation for building new plants.

America is on the edge of that shipbuilding boom which experts have been foretelling for the past five years.

STATUS OF UNITED STATES MARITIME COMMISSION SHIPBUILDING PROGRAM — June 1, 1940

Type of Vessel	Contracts Awarded No.	Contracts Awarded G. T.	Contracts Awarded D. W. T.	Keels* Laid	Launched	Delivered
Passenger — U. S. Lines	1	24,800	13,000	1	1	—
Passenger & Cargo—Mississippi Shipping Company	6	47,868	52,260	3	2	1
Passenger & Cargo, C-3	15	159,500	143,198	8	—	—
Cargo, C-3	18	140,394	224,050	16	10	7
Cargo, C-2	40	260,138	373,521	20	18	16
Cargo, C-1B	34	234,600	307,250	13	—	—
Cargo, C-1A	4	20,112	29,800	2	—	—
Cargo, American Export Lines	12	78,688	107,200	8	4	4
Cargo, Seas Shipping Company	6	40,200	57,600	2	—	—
Tanker	20	220,439	347,575	12	11	9
Totals	156	1,226,739	1,655,454	85	46	37

*As of May 1, 1940.

Fig. 4

S. S. Delbrasil

Maritime Commission's First Cargo The Mississippi Shipping Company Vessels for the New Orleans

Early in June, the Mississippi Shipping Company placed in service the S.S. Delbrasil, the first of three fine cargo and passenger liners building at the Sparrows Point Yard of the Shipbuilding Division of the Bethlehem Steel Company, Ltd. These ships were especially designed for the owners' trade run between New Orleans and ports on the East Coast of South America, known as the Delta Line. Named in conformity with the service, the other two have been christened Delorleans and Deltargentino.

The Mississippi Shipping Company, organized in 1919 by businessmen of New Orleans, has had a healthy expansion under the capable management of N. O. Pedrick, who, during the entire early history of the enterprise, was its general manager, and is now its president.

When the U. S. Maritime Commission called for the cooperation of private owners in rebuilding the merchant marine, Mr. Pedrick was one of the first to respond. He immediately opened negotiations for the building of three vessels, and employed the services of V. M. Friede, N. A., of New Orleans, to prepare a design in close cooperation with officials of the shipping company.

Mr. Friede carried out this design (which was accepted by owners and Commission), and also supervised the construction at Sparrows Point.

The design of Delbrasil is unique in at least two respects. First, she is the first combination cargo and passenger vessel designed and built in America to conform with all the latest regulations for safety and efficiency required and recommended by various Government agencies. She rates the highest classification of American Bureau of Shipping; compiles with all rules and regulations of the Bureau of Marine Inspection and Navigation and of Senate Report 184; and incorporates the National Defense features approved and recommended by the U. S. Navy for ships of her class.

Principal Characteristics

Length OA	492′-0″
Length BP	465′-0″
Beam molded	65′-6″
Depth molded	39′-9″
Load draft	25′-6″
Displacement, tons	14,210
Gross tonnage	8,300
Net tonnage	5,100
Sheer, forward	9′-0″
Sheer, aft	2′-4″
Camber	6″
Shp, maximum	8,600
Shp, normal	7,800
Sea speed, knots	16.5
Passengers	67
Crew	78

Second, the entire decoration layout for public rooms and staterooms was developed by the naval architect in cooperation with officials of the steamship line, so that the details of decoration and of hull structure could be integrated and completely covered in the specifications. Final color schemes were developed by Mr. Friede in collaboration with Mr. Bisbee of the Bethlehem Steel Company.

The principal characteristics of Delbrazil are shown in the table herewith. In general, she is a two-compartment steel vessel of the shelter deck type, transversely framed, with raked stem and fantail stern. She has three complete decks —shelter deck, main deck and lower deck. All decks have nine feet sheer forward and two feet, four inches aft. The shelter deck and superstructure decks have six inches camber; the main and lower decks have no camber. Shell plating and superstructure are riveted, but the majority of joints in deck and bulkhead plating and in all framing are welded.

Cargo Spaces

The hull below the main deck is divided by 10 bulkheads into 11 spaces. From the stem aft, these spaces and their respective lengths are: forepeak fresh water tank, 32 feet; cargo hold number one, 58 feet, 6 inches; hold number two, 45 feet, 0 inches; hold number three, 60 feet; fuel oil tank, 20 feet; boiler room, 25 feet, 0 inches; engine room, 35 feet, 0 inches; hold number four, 67 feet, 6 inches; hold number five, 35 feet, 0 inches; hold number six, 55 feet, 0 inches; and after peak tank, 32 feet, 0 inches.

Number one hatch is 18 feet across and 25 feet long. With the exception of number four above the lower deck, all other hatches are 24

and Passenger Liner is Delivered to as First In a Program of Six Such --South American Ports Run

feet across, and range in length from 20 feet to 35 feet. Through the main, shelter and bridge decks, number four is a trunked hatch with a flush cover—forming part of the games area on the after end of bridge deck.

These hatches are operated by fourteen 5-ton cargo booms hung on king posts and served by fourteen American Engineering Co. cargo winches each driven by a General Electric Co. 50-hp motor. The two winches located at the forward end of number two hatch are backgeared to handle loads up to 30 tons, and a 30-ton boom is stowed there, with arrangements for shipping it when heavy lifts have to be made.

In the lower 'tween decks of number four hold, 10,000 cubic feet of refrigerated cargo space is arranged in two compartments.

Propulsion Machinery

The propulsion plant consists of a single-screw propeller driven through double-reduction gearing by a high-speed, cross-compound steam turbine taking steam from two water tube boilers.

For steam generation, Delbrazil depends on two Babcock & Wilcox single-pass, marine-type water tube boilers, with water wall side tubes, U-tube type superheaters and horizontal air heaters. Each boiler is equipped with four B & W Decagon oil burners. The boilers are installed with the drums fore and aft, which setting permits a wide firing aisle along the ship's centerline. Diamond soot blowers are fitted.

The boilers are designed for 500 psi, but the turbines will be operated with steam at a gage pressure of 450 psi and 750° F. total temperature. Each boiler has a water heating surface of 5,615 square feet, and an air heating surface of 3,322 square feet. The combined normal output is approximately 69,000 lbs. per hour. Desuperheating coils within the main drums furnish saturated steam when needed for steam drive auxiliaries. These boilers were Apexiorized by the Dampney Company of America. The burners are served by a Quimby pump. Bailey automatic combustion control is installed.

Steam from these boilers drives a General Electric Co. cross-compound turbine designed to deliver a maximum 8,600 shp when the propeller is turning 112 rpm. The propeller is a four-bladed solid bronze wheel 19 feet, 3 inches in diameter and 17 feet effective pitch, and designed to give the vessel a sustained sea speed of 16.5 knots when turning 105 rpm and absorbing 7,800 shp.

An astern element is incorporated in the low-pressure turbine casing, and is capable of developing at least 40 per cent of the normal ahead power. A main thrust bearing of the Kingsbury type is installed in the forward end of the low-speed gear casing.

Mounted athwartships directly below the low-pressure turbine casing, and supported entirely by the

S. S. Delbrasil on her trial runs exceeded 17.5 knots.

Top, down: Boiler front and combustion control panel; main turbines, looking aft from port side; main turbines, looking forward from starboard side; and lower engine room level, showing condenser and pumps.

exhaust flange of that casing, is a Bethlehem condenser having a total cooling surface of 8,500 square feet. Served by a C. H. Wheeler Co. air ejector unit, this condenser will hold a vaccum of 28½ inches Hg. when supplied with 14,500 gpm of cooling water at 75° F. by the Worthington main circulating pump.

A Warren pump delivers the condensate to an Elliott first stage deaerating feed water heater of the vertical marine direct-contact type with self-adjusting steam atomizing nozzles. Supplied with steam bled from the main turbines at 10 lbs. pressure, and with inlet water to the vent condenser at 95° F., this unit will deliver 78,500 lbs. per hour of feed water at 240° F. The heater tank has a storage capacity of 1,500 gallons.

From this first-stage heater tank, two Warren multi-stage centrifugal feed pumps driven by Westinghouse turbines force the hot feed water through a second-stage Bethlehem heater of the closed vertical tubular four-pass type with 168 square feet of heating surface. This heater is served by steam at 70 psi gage bled from the main turbine, and delivers the feed to the boiler at 300° F.

For make-up feed, two evaporators are installed on the engine room flat port side. Both are Davis Paracoil, one for raw fresh water, the other for salt. A Davis Paracoil distiller reduces the vapor from the salt water evaporator to fresh distilled water.

Adequate lubrication for the turbine bearings and gear teeth and bearings is assured by a well-designed system for handling the flow of lubricating oil. The sump tank is located under the main gear, and has sufficient capacity to assure ample submergence of the service pump under all conditions up to a 20° list. The pump is a Quimby. It pumps the oil up to a pair of gravity tanks and two storage tanks in the engine room casing, each of which has a capacity for 1,000 gallons. The gravity tanks are equipped with steam heating coils so that they may be used as settling tanks, if required. Two Bethlehem oil coolers are installed, each having a capacity, under normal conditions, for cooling 300 gpm of oil from 140° to 120°.

For cleaning the oil, a Sharples oil purifier and an oil heater are installed on the lower engine room level. This combination will clarify 200 gph of lubricating oil.

The majority of the service pumps in the engine room are electrically driven, and were supplied by the Warren Steam Pump Company. Those not already mentioned include: the auxiliary condensate pump; the auxiliary feed pump; the auxiliary circulating pump; the fuel oil transfer and standby fuel oil service pumps; the fire, fire and bilge, and bilge and ballast pumps; and the general service pumps.

Fresh water, ice water circulating, and hot water circulating pumps were supplied by Allis Chalmers.

To furnish electric power for auxiliary machinery, and for lighting, cooking and heating purposes, two geared turbine General Electric direct-current generating sets are installed on the starboard engine room flat. Each of these sets has a capacity of 350 kw. Under normal operation at sea, these turbines will operate on high-pressure superheated steam with same pressure and temperature conditions as the main propulsion unit, and will exhaust to the main condenser. An auxiliary desuperheated steam line is provided for these turbines, and a Bethlehem auxiliary condenser is installed for port use.

Carrier refrigerating machinery for the cooled cargo spaces, for ship's stores and for air conditioning, is installed on the lower engine room level, port side. Refrigeration on Delbrasil is divided into three loads: ship's stores, which require approximately 4 tons refrigerating capacity; cargo, which requires approximately 618 tons; and air conditioning, which takes approximately 12.6 tons. Three Carrier Freon compressors, each driven by a 15-hp. General Electric motor, are installed with proper auxiliaries to take care of this load.

A fully-equipped machine shop is installed on the engine room flat, port side. The tools include a Le Blond lathe, a Stepto shaper, a Cincinnati tool grinder and a Champion drilling machine.

Safety Equipment

In fire protection, this vessel meets all requirements of U. S. Government agencies and of the Senate Report 184. All paneling and joiner work is of metal or metal-clad Marinite. Two class A-1 fire-resisting bulkheads with automatic self-closing fire doors divide

the accommodation spaces into three zones. Non-combustible fixtures and furniture are used throughout.

For fire detection in the cargo spaces and boiler room, a Lux-Rich system is installed, with smoke detection cabinet in the wheel house and audible alarm in wheel house and in engine room. In these spaces a complete Lux CO_2 smothering system is provided, and also a steam smothering system for extreme emergency.

In public spaces and in staterooms, a Bendix fire-detecting system is used. A complete one-hour patrol system is laid out to cover all vital parts of the vessel. All route stations on this system are equipped with Detex watch clock boxes. Fire mains with adequate pressure and quantity are laid out to cover all of the upper part of the vessel, with adequate provision of hose reels and nozzles.

A fire control station in the wheel house coordinates the use of all fire-fighting equipment and regulates all mechanical ventilation to aid in fire smothering. Mine Safety Appliance Co. self-contained oxygen breathing apparatus are carried in sufficient numbers to permit their use by the engine room personnel and by enough of the deck crew to reach the fire.

For light and power in emergencies, a 75-kw. direct-current generator driven by a Superior diesel engine is installed in the dummy stack at the hurricane deck level. The emergency switchboard controls all emergency circuits, and floats this emergency generator set on the line with an Exide storage battery of sufficient capacity to carry the necessary emergency lighting and start the diesel engine.

On the boat deck, four Welin lifeboats are carried on Welin type C-2 Crescent davits, 2 on the port side and 2 starboard. The forward boat on the port side is driven by a Gray marine diesel engine and is fitted with complete R. C. A. receiving and transmitting radio equipment. These boats are 26 feet long, with a beam of 8 feet, 3⅝ inches, and a depth of 3 feet, 7¼ inches. The diesel-drive boat will accommodate 26 persons, and the other 3 boats will take 46 each. The davits are served by motor-driven double-headed winches and wire falls.

In addition to the boats, there are 2 Welin life rafts with a capacity for 20 persons each. Thus the total floating capacity in an emergency is 204 persons, or forty per cent in excess of the total passenger capacity plus the maximum crew.

Dynamo flat, featuring two turbo generators and the switchboard.

A Graybar Electric public address system is installed, covering all public rooms and safety stations, and the annunciator system is by Bendix.

A complete system of electrically-operating watertight doors for access through watertight bulkheads was furnished by the Heintz Manufacturing Co. Controls for operation of these doors were supplied by Cutler-Hammer Inc.

Deck Machinery and Equipment

The fourteen cargo winches have already been described. The balance of the deck machinery includes:

Two 35-hp. American Engineering Co. single-drum warping winches located on the after end of the shelter deck and having a rope pull capacity of 29,000 pounds at 30 fpm.

An A-E-Co. 75-hp. spur-geared windlass fitted with two wildcats and two warping heads. This windlass is fitted with 2⅛" Naco malleable cast steel anchor chain, and is capable of lifting both anchors from a depth of 30 fathoms at a chain speed of 30 fpm.

The Manila cordage was supplied by Columbia Rope Co. The blocks are Boston and Lockport.

Navigating Equipment

All of the essential accessories to correct navigation of a modern steamship are installed in the wheel house and chart room of Delbrasil.

The standard binnacles, magnetic compasses, electric sounding machine, deep sea lead and hand lead were supplied by the Kelvin and Wilfrid O. White Co.

Sperry Gyroscope Co. Inc. supplied the master gyro compass and repeaters, the Gyro Pilot and the course recorder.

A Fathometer sonic depth indicator was installed by the Submarine Signal Co.

Bendix mechanical telegraphs convey signals between wheel house and engine room.

Henschel rudder angle and shaft revolution indicators show the navigator just what his rudder and his engines are doing.

Radiomarine Corporation provided transmitting and receiving apparatus of sufficient power to keep the vessel in immediate communication with terminal ports at any point in her route. A R. M. C. radio direction finder is installed.

A Leslie-Tyfon whistle is mounted on the stack.

The steering gear, furnished by the American Engineering Co., is of the electro-hydraulic opposed-ram type with the rams mounted athwartship. The main steering gear has two power units, each consisting of a variable stroke hydraulic pump driven by a 40-hp. General Electric Co. motor. The main steering gear control is from a hydraulic telemotor stand in the wheel house to a receiving unit in the steering gear room, and from a two-unit Sperry Gyro Pilot, with transmitter in the wheel house and receiver connected to the mechanical control in the steering gear room. A stand is

Public Rooms on Passenger-Cargo Liner Delbrasil

Top: Two views of the lounge.

Center: The club room and bar, and the cafe and dance floor.

Bottom: Two views of the entrance lobby.

also provided on the shelter deck aft with mechanical connection to the differential control. An auxiliary hand-hydraulic steering gear, consisting of rams and cylinders separate from the main ram and connected to an independent tiller, is operated from the after shelter deck. Each of the main steering gear power units is capable of moving the rudder from hard-over to hard-over, a total of 70°, in 30 seconds, with the vessel going ahead at 17½ knots.

Ventilation

In order to assure maximum comfort for the passengers and crew, the exposed portions of shell and deck are insulated, and air space is left between the shell and sheathing. Mechanical supply and exhaust is provided for all passenger, crew and public spaces; the air outlets in the staterooms is effected through anemo lights, with individually-controlled dampers. Large oscillating fans and two Kearfott type windows in each stateroom are also provided, thus assuring absolute cross ventilation and comfort for the passengers. The dining room, in addition to being mechanically ventilated, is air conditioned by Carrier, so that it is comfortable even on the hottest days.

Passenger Accommodations

Although the ship carries only 67 passengers, the accommodations and public spaces are comparable to those of many a large ocean liner. The passenger entrance hall, located on the shelter deck, is two decks high, and from this radiate the port and starboard alleyways leading to the staterooms. Especially-designed aluminum accommodation ladders are provided in way of the entrance hall for embarkation of passengers. In this connection it is interesting to note that because the Mississippi River at certain periods has very low water, dropping the entrance hall below the levee height, it was necessary to provide an additional entrance gate on the boat deck. Two staircases lead from the entrance hall down to the main dining room, which seats 70, and the private dining room, which seats 10. The main dining room runs the full width of the ship, has a large dome over the center which accentuates its spaciousness, and is completely air conditioned.

Service Spaces

Immediately aft of the dining room is the service pantry, and, aft of that, the galley. Both spaces are laid out so that efficient, prompt servicing of crew and passengers is possible at all times. All trim, sinks and dressers are of Monel, presenting a very smart appearance. All equipment of galley, pantry and bakery, which is adjacent to the galley, is electrically operated, with equipment supplied by the Edison General Electric Appliance Co. Inc.

The galley and pantry are provided with direct expansion, refrigerated spaces for daily use, to be supplied from the ship's refrigerated spaces, which have a total capacity of 2,875 cubic feet in four independent enclosures. Fully-equipped separate pantries are provided for the officers', crew's, stewards' and petty officers' messrooms, and on the bridge deck is another pantry, servicing both the deck and barroom.

There are two laundries aboard, one for the use of passengers, located on the main deck amidship, equipped with machinery supplied by the American Laundry Company; and the second, for the crew's use, in the crew's space aft. A print shop, mail room and ship-to-shore telephone are among the many other passenger conveniences on the vessel.

The staterooms, 26 in number, are unusually large, and are arranged for single, double or triple occupancy, and in several instances may be converted into two-room or three-room suites. All are outside rooms, each having independent bath, built-in wardrobes faced with full-length mirrors, mechanical ventilation, shell and deck insulation, and tasteful modern furniture. They are equipped with large beds, fitted with Simmons innerspring mattresses. The floor is generously carpeted with green seamless rugs. For the partition bulkheads, Prima Vera and plain Formica surfaces are used, while the suites are furnished in Harewood. Light colors with blue-banded trim are used for the furniture, thus giving the feeling of cool spaciousness so essential to the tropical trade. On the shelter deck are located the barber shop and beauty parlor, two-ward passenger hospital, public toilets and various other enclosures.

A grand staircase leads from the entrance hall to the lounge, which overlooks the hall and with it provides a spacious and attractive public space. The after end of the bridge deck house is occupied by the veranda cafe, bar and smoking room, from which access is had to the broad promenade and play deck running completely around the house, and affording ample room for deck chairs and games. The forward end of this deck is completely glass enclosed with Kearfott windows.

On the boat deck, in addition to the wheel house, the chart room and the deck officers' quarters, is the swimming pool, made from Byer's Wrought Iron, tiled around the edges and sides, and appropriately surrounded with outdoor tables, chairs and awnings.

Interior Decoration

The expressed motif throughout the vessel is modern but not modernistic. Tastefully located in the entrance hall, lounge, dining room and veranda cafe are murals by a prominent artist, depicting scenes encountered at the various ports of call, as New Orleans, Rio de Janeiro and Buenos Aires. Mirrors are also used in these locations to enhance their beauty and size.

In the thickly-carpeted lounge the paneling is of Harewood, and at the forward end is a mural above the marble fireplace, in front of which is a semicircular sofa. Throughout the lounge, various pieces of attractive furniture are placed so that there is no clustering or crowding. The theme of the murals is carried out in small fixtures throughout the lounge. In the music corner, at the after end, is a specially-designed Steinway piano.

The cafe, at the after end of the bridge deck house, is reached from either the promenade deck or from the passenger quarters. At the forward end of the cafe is a maple dance floor, and on the forward bulkhead is mounted a golden-colored mirror with illuminated glass blocks below it. Here again aluminum furniture is used, except for the built-in sofas, which are richly upholstered in leather.

On the port side of the cafe is the entrance to the barroom, which is fitted with a curved bar finished in Formica. In addition to the stools in front of it, there are three built-in tables and benches to suit against the outboard bulkhead. Smartly appointed in black and red, with indirect lighting, this space presents a very striking appearance.

The smoking room, located to starboard, has deeply-upholstered furniture and a large poker table in the center.

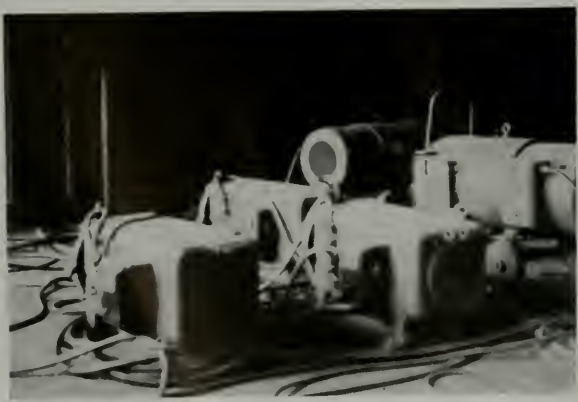
Economical Welding Machines

at Work in Progressive

Pacific Coast Shipyards

Because of the increased demands in the merchant marine program, new revolutionary developments in the design of welding machines have been introduced, making it possible more economically to utilize arc units to do different kinds of welding.

By employing two arc welding units, so placed that it is possible to operate them as single machines or as a parallel combine, the output can be economically regulated. This combine unit lends itself readily in ship construction, because here the majority of the welding is in the overhead and vertical positions on some shifts, while the heavier welding, requiring larger electrodes, is down-hand work and is performed on the next shift. In this connection, by so arranging the welding crews, the initial investment is considerably reduced. For example, it has actually been determined that by forming a welding crew in the ratio of one to two operators on three different shifts, when using double units as a combine—as compared to using single large welding sets—it is possible to effect a savings as high as 32 per



In the modern technique of shipbuilding, the welder is assuming an increasingly important role.

Above: Some welding combines at work on a C-1 hull at Western Pipe & Steel yard, South San Francisco.

At left: Some unstacked arc units used for work in the ship's hull during the outfitting period on S. S. Sea Star at Moore Dry Dock Co.

(Photos courtesy Harnischfeger Corp.)

The Unionmelt machine welding process has many advantages over hand welding. These, however, depend to a great degree on an efficiently-regulated source of electric current. Here we see the application of the D. C. combine to this process applied on fillet welding at Moore Dry Dock Co.

(Photos courtesy Harnischfeger Corp.)

cent. Ordinarily, two 200-ampere arc welders are double-decked and then controlled by means of a switch and proper output adjustment switch to operate the two units as a combine for use either as two 200-ampere units, taking care of overhead and vertical work, or as a 400-ampere unit for the heavy down-hand welding.

Success of these combines has been due to simplicity of design and operative features which include high electrical efficiency and easy connection of each combine to one outlet, usually employed for a single large welding set. These units are usually set for welding by means of a single control on each welder, which makes it possible to operate two units as a combine by merely connecting the single controls. An investigation of the volt ampere characteristics reveals that with this type the units are easily paralleled, since the slope of the V-A characteristics curves is the same, and all possess a high open circuit voltage.

After the hull is launched, an important phase of welding develops during the fit-up period. Since the majority of the welding is with smaller sizes of electrodes during this stage, the parallel combine sets can either be used in the stacked position as single units or can be dismantled and used as single sets in various places. Another of the outstanding advantages in a wide-spread use of these 200-ampere units is their easy portability and compactness, insuring a valuable saving in floor space during the busy outfitting period.

An interesting development in the automatic welding process has been the use of a D. C. arc welder as the source of welding energy. This combine is being used by one of the shipyards on the West Coast for welding light plate fillet welds, as well as some of the heavier plates.

8 Years "Before the Mast"

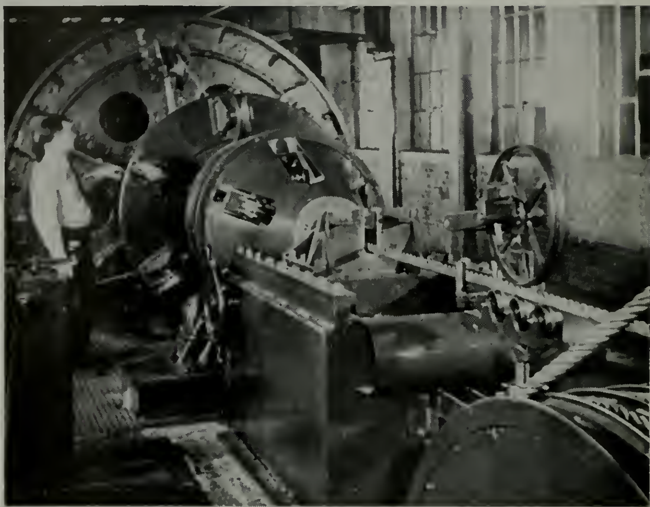
Exposed to winter gales on the North Atlantic and to moist heat of the tropics—subjected to overheating due to hurried loadings in port, and in constant contact with the corrosive influence of salt air and spray on the open sea—such are the grueling conditions under which "Ni-Resist" cargo winch brake drums have served for eight long years without any sign of failure.

In 1931, 48 solenoid brake wheels were cast from this corrosion-resistant nickel-copper-chromium iron by General Electric Co., and installed on Lidgerwood winches aboard the S.S. Chiriqui and other ships of the United Fruit Company. The drums still show a smooth, uncorroded surface. A uniform coefficient of friction, in addition to its corrosion- and heat-resisting qualities, is another advantage which Ni-Resist has demonstrated in this type of service.

Sinews of Steel

Bethlehem Steel Company Produces a Sound Film on the Manufacture and Use of Wire Rope

Bethlehem Steel Company, which added the manufacture of wire rope to its activities three years ago, is now completing an industrial motion picture on the making and use of this product. With the acquisition in 1937 of the Williamsport Wire Rope Company, Williamsport, Pa., now the Williamsport Division, Bethlehem became one of the few manufacturers of wire rope having its own steel-making facilities.



One of the new wire rope machines at Williamsport.

Beginning with the handling of the iron ore, the new picture, "Sinews of Steel," will show the principal operations in steel-making, placing particular emphasis on the fact that steel for wire rope is made especially to meet the requirements of that product. The rolling of rod from the billet on high-speed continuous mills, and the processing of rod into wire for making into wire rope, are covered in detail. Close-ups and section views of wire-drawing operations show the drawing of wire to the smallest sizes.

The principle of wire rope making is shown in the sequences taken in the rope mill, where the course of the wire is followed as it is formed into strand and the strand into rope. By means of close-ups and engineering drawings, the intricacies of wire rope engineering are touched on in an effort to make the picture as good a source of information on the subject as is possible. Illustrations of the many uses to which wire rope is put in industry are also included.

Two building ways in an American shipyard, illustrating the use of wire rope.

The motion picture is being made at a most opportune time, for, during the past year, a number of changes and improvements have been made at Williamsport increasing the efficiency and capacity of the plant. A new cleaning unit used in the preparation of rod for drawing into wire has recently been put in service, and a number of additions of equipment and changes in existing machines made in the strand and rope-making departments. Several new rope-making machines have been installed, which, with other additions, have increased the capacity of the plant for the larger sizes of rope.

"Sinews of Steel" will be a sound film, four reels in length and in 16 mm size. It is being made for presentation at meetings of jobbers and dealers, technical societies, trade associations, and college and representative civic groups.

One From Madeira, A Notable Tuna Clipper

Madeirense on trials.

Built by the Harbor Boat Building Company at Terminal Island, California, the tuna clipper Madeirense (one from Madeira) was delivered to her owners, Manuel F. Vorreia, Manuel G. Cordosa, Antonio Francisco, John Francisco and A. C. Pires, all of San Pedro, California, in March, 1940.

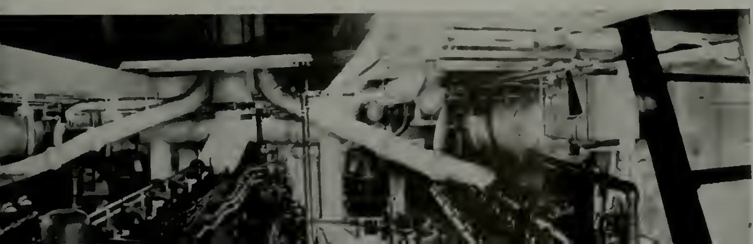
The Madeirense is 124 feet long by 27 feet beam, and has a capacity for 220 tons of sharp-frozen tuna. She makes 12 knots sustained sea speed fully loaded, and has a cruising radius of 8,000 miles.

Her power plant consists of one 600-hp, 6-cylinder, 12x15 Model 33D Fairbanks-Morse diesel engine operating at 400 rpm for propulsion service. She is supplied with two Model 46A8 F-M 6-cylinder, 8x10½ diesels each directly connected to a 125-kw, 125-volt Fairbanks-Morse direct-current generator. Also installed is one 4-cylinder Model 36A4¼ F-M diesel directly connected to one 20-kw, 125-volt F-M generator, which takes care of port service requirements.

All of the units above mentioned, including pump scavenging main engine, are furnished with indirect cooling through the use of Schutte-Koerting heat exchangers, thereby eliminating jacket scaling and similar difficulties due to use of salt water. Accurate and definite control of cooling water temperature is provided. Exhaust silencers were furnished by Burgess.

Either one of the 125-kw generating sets has capacity to carry the complete electrical load, thereby affording 100 per cent standby, which is particularly desirable in tuna fishing operations.

Engine room of Madeirense.



All engines are protected with Garrett signal devices, indicating through audible signal devices failure or excessive jacket water temperature, and also failure or low oil pressures.

The cargo space below deck is divided into eight compartments, four each on both port and starboard side respectively, with further provision for fish storage in the bait tanks mounted aft and on top of the deck. All of these compartments are provided with holding and freezing coils, and circulation for brine is provided through Fairbanks-Morse pumps and motors individually applied to each cargo well. This system provides an individual freezing unit in each well instead of the conventional type employing one central freezing coil with distribution lines to the wells. This arrangement permits definite isolation of the wells, and is particularly desirable when green fish have been taken on board, and permits any contaminated well to be definitely controlled without the possibility of affecting other wells.

The refrigeration system was furnished and installed by the Baker Ice Machine Co. of Los Angeles, Calif., and consists of three ammonia compressors, V-belt driven by Fairbanks-Morse motors, for cargo freezing, and also one galley ice machine providing refrigeration for the galley and crew provision storage requirements. The refrigeration system has been so engineered and designed that fish temperatures can be reduced from 29° to 12° in twelve hours.

Provision for carrying bait is arranged in the bait wells below deck when not used for fish storage, and also bait tanks above deck when not used for fish storage, and bait water is supplied by two 12-inch F-M vertical propeller pumps fitted with bronze propellers, Monel shafts, galvanized column, and driven by 30-hp, 1,150-rpm, 115-volt, solid-shaft, type DZM Fairbanks-Morse motors, with shunt field control. The pumps have a capacity of 3,800 gpm, assuring ample supply of raw sea water for bait life.

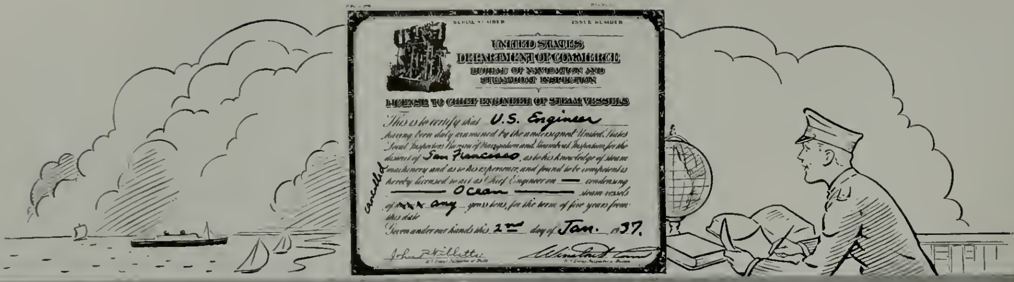
All other pumps and motors, such as bilge, general service, condenser, brine and fuel oil transfer, are Fairbanks-Morse, as also are the domestic water plants.

To afford proper ventilation in the engine room, there has been provided a ventilating fan made by Ilg,, which affords a complete change of air in the engine room every 1⅓ minutes.

The propeller for the Madeirense was furnished by William Lambie of Wilmington, California.

All fuel oil, lubricating oil, fresh water and air receiver tanks were furnished by the National Tank & Mfg. Co. of Los Angeles.

John Rados, president of the Harbor Boat Building Company, was responsible for the construction of the Madeirense, with the assistance of Myles Rados, architect in charge of design. They have provided spacious crew quarters and pilot house, particular attention being given to light, ventilation and convenience in the operating activities required of a tuna bait boat.



Your Problems Answered by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Marine Boilers II

FORMULAS FOR WORKING PRESSURE

In our last article, we developed the formula for the working pressure of a shell as being $W = \frac{STE}{RF}$ when W = working pressure; F = factor of safety, and the bursting pressure is $W \times F$; T = thickness of shell in inches; S = allowable stress in the metal in lbs. per square inch cross-section of metal, usually taken at about 60,000 pounds and stamped by the steel maker on the boiler plate; R = radius of the shell of the drum in inches; E = efficiency of the riveted joints, expressed as a decimal, such as .82, and representing the relative strength of the joint compared to the metal where not drilled or weakened by the joint.

QUESTION

What is the importance of the longitudinal loading in the shell plate?

ANSWER

The fact was mentioned that the load imposed on the shell plates by the end or drum heads was not considered in the calculation of working pressure. That is, only the circumferential stress or loading was considered, and not the longitudinal loading of the cylindrical shell plates. The reason for this is clear if we calculate the working pressure allowable as far as the longitudinal stress is concerned. For instance, in calculating any working pressure, W, we first equate or set up as equal to each other the strength of the metal and the load imposed by the bursting pressure, $W \times F$.

Strength = bursting load.

$2\pi RST = \pi R^2 WF$.

Strength is area of metal times allowable stress.

Area is circumference times T.

Circumference is $2\pi R$.

The bursting load is area times pressure, and area of head is πR^2.

Bursting pressure is WF.

Simplifying this formula by dividing through by πR, we have:

$2ST = RWF$, and transposing, we have:

$$W = \frac{2ST}{RF}.$$

Thus working pressure, as far as longitudinal stress in cylindrical plate is concerned, is twice as great as when circumferential stress is figured. Being always twice as great, regardless of what size of shell or what R is used, we need never be concerned about it.

QUESTION

What do the General Rules and regulations say about circumferential seams?

ANSWER

The above also accounts for the General Rules and Regulations, page 53, statement under circumferential joints, in which a strength of only half that of the longitudinal joint is permitted.

CALCULATING THE EFFICIENCY OF THE RIVETED JOINT

QUESTION

How is efficiency of riveted joint used?

ANSWER

In general, the General Rules and Regulations consider the possibility of failure of a riveted joint in four different ways. The efficiency of each must be calculated separately in order to determine which of the four is the least. The lowest one is then used in the formula for working pressure.

QUESTION

Can a riveted joint be as strong as the metal?

ANSWER

A riveted joint can never be as strong as the parent metal of the plate, unless the plate is thickened at the area drilled for rivet holes.

Obviously any drilling of the plate makes it weaker than the undrilled section. Furthermore, the larger and stronger we make the rivets, the weaker we make the plate. The optimum or most economical design would make the weakened plate just as strong as the rivets. That is, reduce the diameter of the rivets until they shear at the same load that the drilled section fails. This is based on the old adage that, "A chain is only as strong as its weakest link." A boiler shell is only as

strong as the weakest of the plates and the rivets.

QUESTION

How is the joint efficiency calculated?

ANSWER

Considering first the efficiency of the plate. From the accompanying figure it is noted that the strength of the neck of plate metal or ligament between holes in the outer row of a triple riveted butt strap joint is its cross-sectional area times its strength, **S.** The area is **(P-d) × T,** and breaking strength is **(P-d) × ST.** But the strength of the undrilled plate for this same distance along the joint is **PST.** The ratio of the weakest over the strongest is $\frac{(P-d)ST}{PST}$, and this reduces to

$$E_4 = \frac{P-d}{P}.$$

This type of failure would be a tear out of the plate between holes in the outer row.

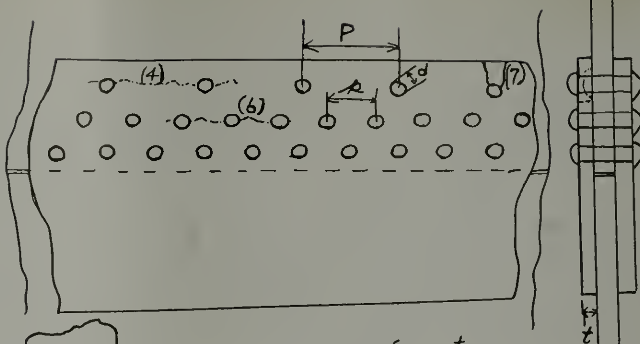
The strength of the rivets is obviously proportional to the number of rivets, and their area and shearing strength is double shear if double straps are used. For triple riveting there will be 5 rivets for each length of **P** along the joint. Let this number be represented by **N.** Then rivet strength is **NAS.** See figure for meaning of symbols. Again the plate strength is **PST,** and the ratio of weakest over strongest is $\frac{NAS}{PST} = E_5$.

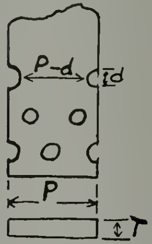
If we assume a failure by tearing out of the plate rivet holes in second row (see (6) in figure), then the rivets in outer row must also shear off to complete the rupture.

By the same logic as used for E_4, we can say that the plate strength ratio there is $\frac{p-d}{p}$. To this must be added the rivet strength ratio. The number of rivets in outer row per pitch **P = n = 1,** and thus strength is **A × S**; hence $\frac{NAS}{PST}$ is ratio.

Adding these two strength ratios, we have $E_6 = \frac{p-d}{p} + \frac{nas}{PST}$.

Still another failure similar to (6) above is a tear out of the plate along the line (6) between rivet holes in the second row plus a tear





a = area of rivet
$= d^2 \times .7854$

S = tensil strength of plate usually 60,000 #/□"

s = shearing strength of rivet. For sleel in double shear = 88,000 #/□"

c = crushing strength of plate usually 95,000 #/□"

N = number rivets per pitch P = Total or 5
n = number rivets per pitch p = Outer row only = 1

$$E_4 = \frac{P-p}{P}$$ Plate failure along line (4) above.

$$E_5 = \frac{Nas}{PST}$$ Failure by shear of rivets

$$E_6 = \frac{p-d}{p} + \frac{nas}{PST}$$ Plate failure along line (6) above plus necessary shear of outer row rivets.

$$E_7 = \frac{p-d}{p} + \frac{ncdt}{PST}$$ Plate failure along line (6) above plus crush failure of straps at outer row rivet see (7) above

Diagram and formulas for triple riveted butt strap joint.

out or crush out of the butt straps under the effect of the outer row rivets. The only difference between this failure and (6) is the butt strap fails instead of the rivet shearing. The plate failure part will be the same as (6). The area of the butt strap loaded by the rivet will be the diameter of rivet times thickness of the strap (usually only one strap extends out to the outer row), or **dt, n** being the number of rivets in pitch, **P,** or 1 and **C** the crushing strength, usually 95,000 lbs. per sq. in. We have for the efficiency, $E_7 = \frac{p-d}{p} + \frac{ncdt}{PST}$.

QUESTION

Does the cylindrical shell formula apply to small cylinders like tubes?

ANSWER

The above formulas are for boiler shells and drums. The same logic and theory lies behind the formulas for tubes in boilers or superheaters with internal pressure. They are, however, modified to fit the special limitations. For instance, for the specified materials used in seamless or lap welded tubes, the stress is specified, the safety factor is specified, an empirical deduction is made from the measured thickness to al-

(Page 78, please)

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Cargo and Stowage Questions

I VENTILATION

Ventilation is a factor which has great effect on the efficient carriage and stowage of a vast majority of cargoes. It would be impossible here to describe every means and method adopted for all cargoes. The people in charge of the loading and carriage of goods must treat each case or each cargo separately, according to its special requirements.

Some cargoes require surface ventilation, others internal ventilation, and some require no ventilation at all. It must be clearly understood, however, that while certain suggestions have been made as the results of practical experience, it is felt to a great extent that the question of ventilation must be left to those concerned to use their own discretion, and to be guided by prevailing circumstances.

QUESTION

What are the pressure system and the exhaust system of ventilation?

ANSWER

In large passenger ships with several heights of decks, the ventilation problem has been satisfactorily overcome by either the pressure system or the exhaust system. In the pressure system, fresh air is drawn down the ventilator by fans and forced through sheet iron ducts to the various compartments; in the exhaust system, fans draw the foul air from the compartment and exhaust it up the cowls, the fresh air entering the ventilating ducts.

QUESTION

What is the Thermotank System of ventilation?

ANSWER

The Thermotank System is a combination of ventilating, heating and cooling. The air is drawn by fans into a casing, comes into contact with the surface of pipes, and is then forced through ducts to the various parts of the ship. The temperature of the air may be left as it is, or heated by circulating steam through the pipes, or cooled by circulating brine through them.

QUESTION

In what direction does heated air in a confined space travel relative to that of the outside wind? How is advantage taken of this natural law in ventilating the holds?

ANSWER

Having regard to the natural law, by the operation of which heated air in a confined space travels in a direction contrary to that of the outside wind (which law should be kept well in mind when dealing with fire in the holds), the ventilation of holds is best effected when the weathermost cowls (forward cowls with wind ahead or on bows, port cowls with wind on port side and vice versa) are kept back to wind and the leemost on the wind, and it is in this connection, more particularly, that the intelligence of the bridge officer should always be exercised, rather than by the issuing of a short order, "trim the ventilators," leaving it to the deckhand.

QUESTION

Why is the proper ventilation of holds indispensable to the correct carriage of most goods, and to the preservation of the ship structure

Deck Officers' Licenses for May

Name and Grade	Class	Condition
SAN FRANCISCO		
E. A. Clark, Master	SS & MS, any GT	RG
G. S. Center, Chief	SS, any GT	RG
J. Fox, Jr., Chief	SS, any GT	RG
K. E. Katlas, Chief	SS, any GT	RG
B. H. Anderson, 2nd Mate	SS, any GT	RG
P. B. Ludvigsen, 2nd Mate	SS, any GT	RG
W. S. Warnekros, 2nd Mate	SS, any GT	RG
R. H. Casarotti, 3d Mate	SS, any GT	O
J. Clague, 3d Mate	SS, any GT	O
A. W. Cranstoun, 3d Mate	SS, any GT	O
F. V. Foot, 3d Mate	SS, any GT	O
W. M. Fox, 3d Mate	SS, any GT	O
E. A. M. Gendreau, Jr., 3d Mate	SS, any GT	O
E. E. Maxwell, 3d Mate	SS, any GT	O
R. W. Racouillat, 3d Mate	SS, any GT	O
D. Schulman, 3d Mate	SS, any GT	O
R. H. Sonneman, 3d Mate	SS, any GT	O
F. V. Thompson, 3d Mate	SS, any GT	O
V. N. Urbani, 3d Mate	SS, any GT	O
F. J. Welch, 3d Mate	SS, any GT	O
R. B. Wilkie, 3d Mate	SS, any GT	O
PORTLAND		
G. P. Plover, Chief	SS, any GT	RG
J. C. Phillippson, Chief	SS, any GT	RG
J. A. Wick, Chief	SS, any GT	RG
SAN PEDRO		
A. B. Page, Master & Pilot	SS, any GT	RG
J. E. Wilson, 3d Mate	SS, any GT	O
SEATTLE		
H. R. Leln, 3d Mate	SS, any GT	O
E. S. Horgen, 3d Mate	SS, any GT	O
J. M. Kildall, 2nd Mate	SS, any GT	RG
W. R. Hansen, 3d Mate	SS, any GT	O
A. B. Castle, Chief	SS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

itself, and absolutely necessary for the safety of crew and ship in the carriage of cargoes which give off inflammable and explosive gases, or are liable to spontaneous combustion?

ANSWER

The proper ventilation of holds is indispensable to the correct carriage of most goods, and to the preservation of the ship structure itself, while with coal cargoes and those which give off inflammable and explosive gases, or are liable to spontaneous combustion, it is absolutely necessary for the safety of crew and ship.

Insufficient ventilation often results in overheating, deterioration and spontaneous combustion of cargo; is responsible for sweat, taint and rust damage; and permits poisonous and explosive gases to accumulate, to consequent danger of crew and ship.

QUESTION

Describe a system of natural ventilation whereby the rate of circulation of air through the lower tiers of cargo is accelerated, and explain what provision is made in such a system for surface ventilation when such is required for bulk cargoes, such as coal, or other cargoes, such as bulk grain, which would, of course, seal any downtake opening which might be provided below the surface of the cargo.

ANSWER

An excellent system of the natural ventilation of holds, one which takes full advantage of the natural law by which heated air rises and cold air falls, is to be found in a few modern ships, a system which fully justifies the little extra cost involved by giving infinitely better results and immunity from claims for sweat and taint damage, etc. In this system half the ventilators serving each compartment are led down nearly to the bottom of the compartment, the other half (the uptakes) terminating at the underside of the deck, as customary in other vessels.

In order to ensure clear holds, the downtakes may be led under the deck and down the sides, the air ducts being formed by utilizing the deck beams and side frames, which are lightly plated over for that purpose.

Fresh air is thus led and discharged into the lower tiers of cargo, where it displaces the heated air, etc., and effectively assists in accelerating the rate of air circulation through the mass of stowage, at the same time keeping the cargo cool.

To meet the special requirements of bulk cargoes, such as coal, which requires surface ventilation, or other cargoes, such as bulk grain, which, of course, seal the downtake opening described above, the downtake air ducts are provided with trap doors at a convenient position under the deck, which, when opened, connect all ventilators to the upper stratum of air in the compartment.

QUESTION

What means are taken to permit heated moisture-laden air, which would otherwise be imprisoned on the underside of decks, between beams, etc., to move with the general circulation towards the uptakes?

ANSWER

Much avoidable condensation occurs in ships' holds on the undersides of decks, beam, etc., where the moisture-laden air is trapped in a layer of from 11" to 13" deep (depth of beams) and denied access to the uptake ventilators, the moisture when condensed falling on the cargo below. To correct this condition, ¾" or 1" holes are provided at frequent intervals along the neutral axis of deck beams from side to side, also in the upper part of the side framing, and 3" or 4" holes in the beam knees close to the intersection of beams and frames. These holes permit the heated air, otherwise imprisoned between the beams, etc., to move with the general circulation towards the uptakes, and much condensation of moisture is thus avoided.

QUESTION

What cargo charters lay special emphasis on log entries relative to ventilation of holds?

ANSWER

A record of attention given to the ventilation of holds should always appear in the mate's log, special mention to be made of the uncovering of hatches, the necessity for unshipping cowls and plugging ventilators, etc. Rice charters lay special emphasis on this requirement.

QUESTION

How are the cargoes of rice ventilated?

ANSWER

When loading rice in bags, ventilators are placed all fore and aft over every few tiers. These fore and aft ventilators are in communication with vertical ventilators communicating with the deck ventilators.

QUESTION

Describe the arrangements made for ventilation of a cargo consisting of green fruit.

ANSWER

Boxes of green fruit are stowed in tiers from deck to deck, with laths of dunnage about 1 inch square laid between each tier both horizontally and vertically, so as to ensure airspace all around the boxes.

The ventilation of green fruit depends on whether it is carried in a refrigerated space or not. If it is carried in a refrigerating chamber, the stowage mentioned above must be adhered to and the refrigerating engineers, at regular intervals during each day, change the air in the chamber by forcing cooled air in through the air-ducts and vents, and take out the stale air by the means of fans. There is no ventilation from deck ventilators, as fruit carried in this manner has to be kept at a certain temperature.

When not carried in cooling chambers, the ventilation may be natural or induced. Induced ventilation is usually made by having electric fans fitted into permanent uptake ventilators which suck out the stale air, and the fresh air flowing in via the down-take ventilators takes its place. With natural ventilation, the lee ventilators should be turned on the wind and the weather ventilators back to wind, and the hatches opened whenever the weather permits.

In all three cases, the temperatures of the holds or chambers should be taken at least every six hours and recorded in the cargo log, and remarks are to be made in the mate's logbook as to the ventilation arrangement.

QUESTION

Under what conditions are coal cargoes most dangerous; that is,

(Page 76, please)

All-Welded C-1 Cargo Carriers

Western Pipe & Steel Building Largest All-Welded Steel Hulls Ever Constructed in a Pacific Coast Shipyard

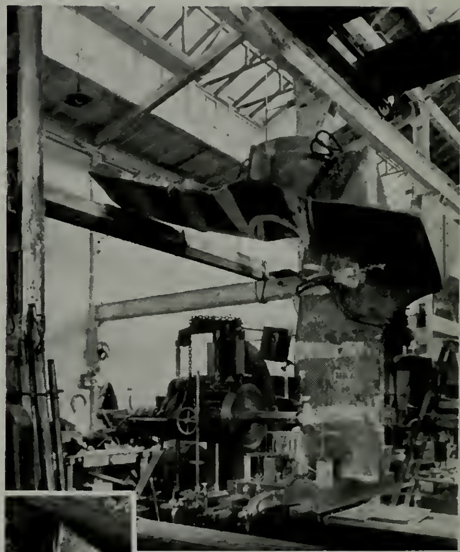
The pictures illustrating this short article show some of the steps in the construction of cargo vessels at the plant of the Western Pipe & Steel Company, San Francisco, where the hulls of the first two of five C-1 type cargo motorships building for U. S. Maritime Commission are rapidly nearing completion.

The stern frames for these vessels are designed to be of steel, cast in four sections. These sections are machined for perfect joint fits, and are fastened together by bolting and welding. Since the stern frame carries bearings for the propeller shaft and for the rudder, the joining and the machine work must be done to a fairly exact degree of tolerance.

All of these castings were made by Columbia Steel Company of Pittsburg, California. As will be noticed in the illustrations, they are of considerable size. The total assembled weight is 61,914 pounds, or approximately 31 tons. Due to the large boss for the propeller shaft bearing, the propeller post is the heaviest of the four sections, and weighs 17,445 pounds. Fabrication and erection are making fast progress in the yard, and the profiles of two fine ships are daily becoming a more noticeable feature in the South San Francisco scene. These five C-1 ships are to be completely welded hulls, and will be the largest all-welded steel hulls ever built on the Pacific Coast.

In this type of welding work, Western Pipe & Steel have had long experience. They have done much fabrication of barge hulls, pipe lines, penstocks and large structural work, and are well equipped with machines, jigs and experience to tackle any welding procedure.

The first hull is scheduled to go over the side in August. The ways are side launching ways, and much anticipatory interest is being shown by the launching fans, who remember the thrill of the big splash kicked up by



Machining the stern frame for one of the C-1 all-welded cargo vessels building at the South San Francisco yards of the Western Pipe & Steel Co.

View from the shop crane, showing the complete assembly of the stern casting on the floor of the shop.

the side launchings there in 1918, and of the salt water bath for spectators which often followed.

The five Western Pipe & Steel Company C-1 cargo vessels will be not only the largest all-welded hulls built on the Pacific Coast, but, if memory serves correctly, will also share with the five similar ships building by Seattle-Tacoma Shipbuilding Corp. the honor of being the largest diesel motorships built on the Pacific Coast.

Their general characteristics are:

Length overall	416 feet, 0 inches
Length B. P.	365 feet, 0 inches
Beam molded	60 feet, 0 inches
Depth molded, S. D.	37 feet, 6 inches
Draft, loaded	27 feet, 6 inches
Displacement, loaded	12,875 tons
Cargo deadweight	8,000 tons (approx.)
Horsepower (normal)	4,000
Sea speed, loaded	14 knots

Turning the rudder stock for a C-1.

Trade Literature

Mechanical Rubber Goods, a 24-page, profusely illustrated book published by the B. F. Goodrich Company and presenting a condensed catalog, a section of engineering data, and a guide to selection, covering that firm's line of rubber goods used in the mechanical arts.

Illustrated and described are: conveyor belt systems; transmission belts, both flat and V; hose and fittings; and miscellaneous lines of rubber products. The latter include: hard rubber sheet and pipe; rubber linings and rubber-lined tanks; the various types of rubber packing; rubber paints, cements, putty and plastic compounds; Vibro-Insulators for reduction of noise and vibration; rubber expansion joint fillers; rubber mats and matting; and rubber tape.

Airco Electric Welding Products, a 32-page illustrated booklet just issued by Air Reduction, describes the complete line of Airco electrodes and Wilson electric welding machines.

This booklet discusses various types of electrodes and offers suggestions as to where each type can be used to best advantage. Included in the description of each electrode is (1) a general description; (2) suggested applications; (3) welding procedure; (4) physical properties; (5) specification table.

Another section is devoted entirely to electric welding accessories, such as aprons, brushes, cable, graphite electrodes, face shields, leather gloves, goggles, helmets and electrode holders.

A page of excerpts from *Welding Symbols and Instructions for Their Use,* as published by the American Welding Society, is another feature.

The concluding section offers a detailed discussion of the "Hornet," "Yellow Jacket," Model MCT and Model GA Wilson electric welders.

The Airco No. 10 Planograph, a new 4-page bulletin published by Air Reduction Sales Company, New York, describes this gas-operated cutting machine designed for cutting straight lines, rectangles, circles and irregular shapes from ferrous metal of any thickness within the present practical limits of the cutting torch.

The bulletin contains a complete pictorial representation of the planograph, as well as operating details and specifications. Features of the device are listed, such as its wide cutting range, single- or two-torch operation, centralized location of electrical controls, interchangeable devices for manual tracing or magnetic and templet tracing, and central gas control unit.

Welded Steel Hulls, Bulletin No. 213, the Dravo Corporation, Pittsburgh, Pa. A comprehensive bulletin just prepared by Dravo Corporation tells an informative story regarding the use, design and construction of welded steel barges. The treatment is both narrative and explanatory, and 84 photographs illustrate the text. Twenty types of barges, covering both harbor service and river transportation, as well as a number of rowboats, derrick boats, dump scows and ferry flats, are described.

The booklet contains: A review of Dravo facilities; a section on barge design, featuring tow efficiency which results from scientifically-engineered and pre-tested hull and rake end designs; results of some of the model basin tank tests involving various rake end shapes; discussion of structural details which give ruggedness and damage-resisting strength; the patented Dravo skegs to prevent yawing of barges that are towed astern; rolling hatch covers for weatherproof cargo transport; fabrication and assembly of welded hulls, with particular attention to the arrangement of facilities in a unique adaptation of the line assembly method of production; description of many of the Dravo positioning devices and welding routines; a discussion of operation and maintenance; and loading tables for standard size barges, with a review of recent tank tests on towing efficiency.

Specialists in Heavy Lifts

The pictures on this page show Haviside lifting equipment handling unusual marine shipments.

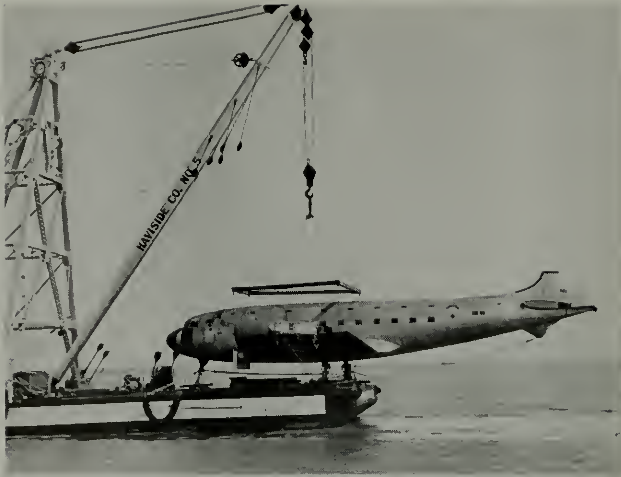
Below, a Haviside derrick barge is lifting heavy parts of a gold mining dredge, which are being shipped to Alaska by the Yuba Manufacturing Company of San Francisco.

The pictures at right show one of the most spectacular and efficiently-handled heavy lifting jobs ever tackled on San Francisco Bay. One of the Haviside derrick barges lifted the DC-4, largest land plane ever built in the United States, and placed it aboard the barge at Oakland Airport. The Haviside barge then came around via San Leandro Bay, passing through the Bay Farm Island bridge.

In going through this bridge, the DC-4 had to be hoisted high enough to clear the bridge structure. This operation successfully concluded, the barge then proceeded to the powder anchorage, where the giant plane was loaded aboard the Japanese motorship Asakasan Maru for transport to Japan.

It is interesting to note that the DC-4 as handled by the Haviside derrick barge had dimensions of 96 feet long, 74 feet wide and 26 feet high, the wing tips having been removed and crated.

American Wire Rope is standard in Haviside lifting feats.



The United States

Passenger Liner America

Some Notes on Her Auxiliaries and Equipment as Furnished by the Manufacturers Thereof

In our June issue we published a complete description of this great passenger liner as presented in a technical paper by Harold F. Norton, naval architect, and John F. Nichols, chief engineer, of the Newport News Shipbuilding and Dry Dock Company.

Editorially we interpolated in parentheses the names of certain manufacturers of equipment and machinery where such names do not appear in the original paper.

An error made in this manner needs correction. Under the subhead "Generating Plant," on page 52A, the first three lines should read, "The main generating plant consists of four (Westinghouse) turbo-generators each rated 600 kilowatts."

Steering Gear and Deck Machinery

The Lidgerwood electro-hydraulic main steering gear is capable of handling the ahead rudder torque of 16,800,000 inch. lbs. at 23.5 knots and the astern rudder torque of 26,000,000 inch lbs. at 15 knots without exceeding 1500 pounds per square inch oil pressure in the system.

The steering gear consists of two forged steel rams, 18" diameter, arranged parallel to each other and placed fore and aft in the ship. Each ram operates in a pair of cast steel cylinders, and is connected to the cast steel rudder crosshead by means of forged steel connecting rods and pins. The cylinders are connected by piping through valves to either of two independent power plants, each consisting of a variable stroke Northern Pump Company's pump having a capacity of 325 gpm, driven through a Foote Brothers gear reducer by a 150-hp General Electric Company's motor.

Each power plant has its own control of the full follow-up, springless type, controlled from the pilot house by either a Lidgerwood hydraulic telemotor or Sperry Gyro Pilot; from the bridge by a column and wheel connected to the forward hydraulic telemotor unit; from the trick steering station in steering room; and from the aft deck column connected to the trick steering station.

The electro-hydraulic steering gear of America set up in the Lidgerwood shops.

The steering gear provides for multiplicity of control, inasmuch as either power plant may be operated from any steering station, and in addition either power plant may be connected to all ram cylinders, or with only the port cylinders, or with only the starboard cylinders.

A Lidgerwood electric emergency steering gear, driven by a General Electric 25-hp motor, is mounted on the upper deck and operated there, and is connected to the rudder stock by worm gearing and a quadrant.

The Lidgerwood main windlass consists of two independent units, each driven by a 100-hp General Electric motor through a high-speed worm gear reduction and a low-speed gear reduction. The arrangement of the drive is such that each motor may drive its own windlass; each motor may drive the other windlass but not simultaneously; one motor may drive both windlasses simultaneously; but both motors simultaneously cannot drive one windlass. Each windlass has a capacity to hoist a 21,650-lb. anchor and thirty fathoms of 3" die-lock chain from a depth of 60 fathoms

without exceeding 50 per cent overload on the motor.

The Lidgerwood stern windlass has a capacity to lift a 7,805-lb. anchor and 30 fathoms of 1⅝" die-lock chain through worm and spur gearing by a 25-hp General Electric motor.

There are five Lidgerwood electric capstans, four having the power plant below deck, while the fifth is deck mounted. Each capstan is driven by a 75-hp General Electric motor, and has a capacity of 25,000 lbs. pull at a rope speed of 50 feet per minute.

Paneling and Furniture

The following brief description outlines the accommodation bulkhead panels and furniture as furnished to S. S. America by W. & J. Sloane.

In order to supply a satisfactory bulkhead material for the staterooms and public spaces, a Marinite panel was cross-banded and veneered in the furniture factory of W. & J. Sloane, the method used being the Permo-Weld process. In this process the adhesive used is one of the liquid resin types, and requires a hot plate press for the operation. This press, the latest and most modern in use, automatically controls the pressures and temperatures required. The combination of heat and pressure produces a chemical reaction in the glue, converting the liquid resin into a hard, insoluble glue line.

Veneers glued by this process can be soaked in water or allowed to weather indefinitely without separation of the plys. The practical and the beautiful are thus combined to produce a rich and fine wood paneling.

The staterooms are paneled with rift oak, walnut, mahogany, primavera and white maple. The public spaces are paneled in the same woods as the staterooms, with these additional woods: Macassar ebony, curly maple, quartered oak, lacewood and zebrawood.

Throughout the accommodations, extensive use has been made of modern bleached finishes in the paneled rooms.

Furniture

All of the wood furniture was built in Sloan's factories and was veneered by the same Permo-Weld process as described above for the bulkhead panels. For the respective compartments, it is described as follows:

Cabin Class Lounge. Is of bleached walnut of American Contemporary design throughout, finished to match bulkhead panels. The tables and cabinets are of bleached walnut. The Cabinets have an anodized aluminum scroll design. The upholstered furniture is covered in neutral beiges and soft green hand-woven and embroidered fabrics.

Cabin Class Ballroom. The curved and shaped sofas are completely upholstered in off-white leather with base finished grey to match the bulkhead panels. Some of the curved pieces are 25 feet long, and follow the contour of the bulkheads.

Smoking Room. Tables and upholstered furniture are of ebonized maple to match the bulkheads. The tables are finished with blister-proof, alcohol-resistant tops. The curved and straight sofas are made in three sections and covered in blue hand-woven fabrics. The easy chairs and open armchairs are covered in blue and red full top-grain leather.

Writing Room. The desks and cabinets are made of lacewood with mahogany inlaid bandings, and finished to match the bulkheads. The furniture is upholstered in soft blue fabric.

Cocktail Lounge. The wall sofas and upholstered chairs are covered in bright green leather; the wood is finished to match the ebonized bulkhead panels.

Tourist Class Public Spaces. The furniture is made of various woods, such as oak, Macassar ebony, mahogany, primavera, with modern bleached finishes which in many cases match the bulkhead panels. In these spaces, as in the cabin class, the upholstered pieces were covered in full top-grain leather and in specially-designed fabrics in damasks, rough-textured hand-woven and embroidered fabrics.

Third Class Public Spaces. Furniture is in oak, mahogany and walnut in modern bleached finishes, and upholstered pieces are covered in full top-grain, rough-textured fabrics and printed linens.

Throughout the public spaces, natural and golden bronze anodized aluminum has been used for inlays and as decorative motifs in cabinets and tables.

Staterooms. All wood furniture, such as chests, night tables and dressing tables, as well as the upholstered chairs and benches, were made to match the wood veneered bulkheads, and the same bleached finishes were used on both.

Officers' Rooms. The furniture in these rooms was made with the same treatment as that in the staterooms.

Warren Centrifugal Pumps

The Warren Steam Pump Company Inc. supplied centrifugal pumps for many services on S. S. America, including the following:

Four 4" vertical centrifugal two stage main condensate.

Four 1½" vertical centrifugal two stage auxiliary condensate.

Two 3" horizontal centrifugal single stage sanitary.

Two 3" horizontal centrifugal single stage fresh washing water.

Two 1½" horizontal centrifugal single stage ice water circulating.

Two 14" horizontal centrifugal single stage dynamo condenser circulating.

One 3" horizontal centrifugal single stage clean ballast.

One 2" horizontal centrifugal single stage heating system drain condenser circulating.

One 1½" vertical centrifugal two stage heating system drain condenser condensate.

Two 3" horizontal centrifugal single stage air conditioning brine cooler circulating.

Two 2" horizontal centrifugal single stage cargo and ship's stores brine circulating.

Two 1½" horizontal centrifugal single stage service box brine circulating.

One 2" horizontal centrifugal single stage brine circulating.

All of these pumps are driven by General Electric Co. marine type motors.

The sanitary, fresh washing water and ice water circulating pumps have bases of bronze with all bronze fittings; all other pumps have cast iron cases with bronze fittings. The main and auxiliary condensate and heating system drain condenser condensate pumps are fitted with Monel impellers.

Electric Time System

The electric clock system installed on S. S. America is of the very latest design, consisting of a master control clock operating 36 outlying secondary clocks of various-sized dials and types of cases.

The secondary clocks are of a beautiful design, with cast metal cases, convex glasses, specially - designed dials, numerals and hands.

The clocks on the exposed decks are of the weather-proof type, while the clocks in the main lobbies and foyers are large 18" dial mirror glass with cast material numerals and specially-designed hands.

The system is so arranged that time changes can be readily made when the ship is going in an easterly and westerly direction. These time changes are controlled automatically from the master control panel and make a very convenient method of keeping this large number of clocks to the correct time.

In addition to the rapid time setting feature, each secondary is equipped with an automatic resetting movement which keeps all the secondary clocks in exact synchronism with each other. This automatic resetting feature is controlled from the master control panel, and to our knowledge is the first time that this automatic resetting feature has been applied to ship clock systems.

The system operates from one of the storage batteries installed on the ship, thus giving the system continuity of service.

The equipment was sold, designed and manufactured by The Standard Electric Time Company of Springfield, Mass.

Uptake Temperatures

For indicating the heat of exhaust gases, America has an installation consisting of two Thwing Model 34 marine type indicating pyrometers, and four Thwing Model A6S.C. thermocouples, connected to the pyrometers with Thwing type A6 cold end extension wire.

The selector switch and the indicating mechanism of the pyrometer are contained in one fume-, moisture- and dust-proof case, made of Navy aluminum alloy.

The temperature scale has full figures for each 100° F., and runs from 32° to 1,200°. The pyrometer is calibrated for a range from 40° to 1,000° with convenient zero adjustment.

Safe Valve Controls

The Philadelphia Gear Works supplied a number of their Limitorque Valve Controls for operation of various valves on S. S. America.

This patented device is designed for mounting on top of the valve yoke. A sleeve driven by a worm and worm wheel takes the place of the operating nut. The worm shaft is actuated by a handwheel and/or an electric motor. All gears, bearings and switches are enclosed in an oil-tight, water-tight and dust-tight housing of steel. All

spur gears are accurately cut in steel. The worm gear is of chilled nickel bronze, and the worm of case-hardened nickel steel ground and polished.

In closing the valve, the motor drives the worm shaft through helical gears. The worm gear has a heavy lug projecting from the hub. The worm drives the worm gear until the gear lugs strike corresponding lugs on the drive sleeve. This allows the motor to reach full speed and impart a hammer blow to start the valve disk in motion. When the valve seats or meets an obstruction, the sleeve is retarded, causing the worm to slide axially along the worm shaft. Movement of the worm trips the torque switch, which interrupts the holding coil circuit, stopping the motor.

This action insures tight valve closure without strain on the valve parts. Protection from damage due to foreign objects obstructing the closing of the valve is insured, since the motor is shut off by the thrust exerted on the valve disk. Thus the valve is protected during the entire closing operation. This torque switch has a simple micrometer adjustment by which the seating pressure can be varied up to 40 per cent.

In opening, the operation is the same as in closing, except that the motor is stopped at the desired point by the geared limit switch, which is driven from the worm shaft. This switch is provided with contacts which control the motor and indicating lights. After installation of the unit on the valve, the limit switch is set to open the holding coil circuit of the controller at the desired point, causing the motor to stop. Once this limit switch is set, no further adjustment is required.

Elevator Equipment

America carries: five passenger elevators, three for cabin and two for tourist class; one engineer's elevator; one service elevator; and one baggage elevator. All of these are electric drive, and are furnished by the Otis Elevator Company.

Elevators Nos. 1 and 2 are of the micro drive car switch control type, having platforms 4' 9" by 5' 0" and a speed of 150 fpm with 1,800 lbs. load. They are located in the cabin class foyer stairwells, 170 feet aft of stem of ship, and serve the cabin class passengers from A deck to the sports deck, a lift of 47 feet.

Elevator No. 4 is of the same type and speed as Nos. 1 and 2; has a platform 4' 3" by 5' 0", and serves from the swimming pool at D deck level to the sports deck, a lift of 74' 4". Its location is amidships about 200 feet aft of Nos. 1 and 2.

The two tourist passenger elevators, Nos. 6 and 7, are also of same type and very similar character.

The engineer's elevator, No. 3, is of the pushbutton control type; has a speed of 100 fpm with 1,000 pounds load, and travels from B deck to sun deck, a lift of 48 feet.

The service elevator, No. 5, is practically the same as the engineer's elevator, lifts the stores from the hold

to A deck, a vertical distance of 35 feet.

No. 8 is used to lift baggage from D deck to main deck, a rise of 36′ 8¾″. It has a platform 4′ 5″ by 5′ 4″, and will raise a load of 1,800 lbs. at 60 fpm.

Electric Dumbwaiters

For galley and pantry service, S. S. America is equipped with eight automatic electric dumbwaiters, each of 350 lbs. capacity, 100 fpm car speed.

Some of these serve adjacent decks only, and others serve several decks. The cars are of non-corrosive metal with adjustable shelves and bronze guides. All dumbwaiters have full automatic button control with "in use" lights at each landing. Various safety devices are incorporated in the construction, including a device for instantly stopping the car should it be overloaded or should it be obstructed in its up or down travel.

All the power units are duplicate, which is an important feature on shipboard, as replacement parts fit all units.

The landing doors are bi-parting, quick-operating type, and are fitted with electric contacts, door locks and vision panels.

This equipment was especially designed for marine service, and was made and installed by the Geo. T. McLauthlin Co.

Oil Purification

For the smooth, continuous operation demanded of the geared turbines on S. S. America, clean lubricating oil is absolutely essential, and since oil in its lubricating mission is continually picking up moisture, dirt and metallic particles, and forming sludge, some method of continuous cleansing is required. To perform this function, the owners of S. S. America chose two No. 6 Sharples Vaportite Super-Centrifuges.

This centrifuge is a streamlined, completely enclosed model, which not only cleans the oil very effectively, but also prevents the vapor incident to the cleaning operation from escaping into the engine room. Each No. 6 Sharples has a height of 58¼ inches and requires a floor space of 35″ x 28″.

Thrust Bearings

Each of the two propeller shafts of the America is fitted with a 45-inch Kingsbury style FF main thrust bearing with six thrust shoes operating in each direction. Each bearing is designed to take a thrust load of 231,000 pounds. The thrust collar, which is integral with the shaft, is 45 inches in diameter.

Each of the three rotors in each of the two triple expansion main turbines is fitted with Kingsbury 6 x 3 shoe thrust bearings. These bearings have thrust collar diameters of 9″, 10½″ and 12″ for the H.P., I.P. and L.P. turbine casings, respectively.

Oil Pumps

The new United States Lines passenger-express liner depends on Quimby Screw Pumps for service of lubricating oil, fuel oil and diesel oil. Nine of these pumps are installed, as follows:

There are four lubricating oil service pumps. These are Quimby Screw Pumps, size No. 6, of vertical pattern, gear-in-head design. Each pump has a capacity of 600 g.p.m. maximum of lubricating oil at 40 lbs. discharge pressure with 15″ mercury vacuum on the suction. The oil has a viscosity of 500 SSU at 100° F., and it is handled at temperatures from 70° F. to 100° F. These pumps are each equipped with 30-H.P., variable-speed, direct-current motors, ranging from 600 to 1,200 r.p.m. By means of this, the capacity can be cut down while the vessel is in port and when not as many of the bearings needing lubrication are in service.

In addition to the lubricating oil pumps, there are four Quimby Screw Pumps, size No. 3, of vertical pattern, gear-in-head design on fuel oil service. These pumps are designed to handle 35 g.p.m. maximum of fuel oil at 300 lbs. discharge pressure, handling the oil at a variation of viscosity from 700 to 7,000 SSU at the operating temperature. Each of these pumps is provided with a 15-H.P., variable-speed, direct-current motor ranging from 1,010 to 1,350 r.p.m.

Also, there is one Quimby Rotex Pump, size No. 1½ AB, of horizontal pattern, gear-in-head design. This pump has a capacity of 15 g.p.m. of diesel fuel oil against a discharge head of 200 feet. The oil has a viscosity varying from 700 to 7,000 SSU at the operating temperature. This pump is provided with a 2-H.P., 1,150 r.p.m., direct-current motor.

Decorative Treatment

The following description of the decorative treatment of the public rooms on America is furnished by the firm of Eggers & Higgins, New York, who designed these rooms:

On the promenade deck ample space is provided for lounging, dancing and exercise. The smoking room, forward, based on a circular design, and containing a bar, service bar and tobacco shop, is finished in ebonized veneer with dark floor and light ceilings. Two curved murals grace the aft wall. The color note here is ebony, gold, soft blue and red.

The main lounge is the full height of two decks, with mezzanine on the outboard of portions of the space. Beige walls—glazed—golden bronze trim, soft gold leaf ceiling and colorful furniture are used to give a restful quality. A stage for concerts and cinema is an element of the room.

The graceful bar is lighted by groups of lucite tubes, which throw a mellow glow over this space.

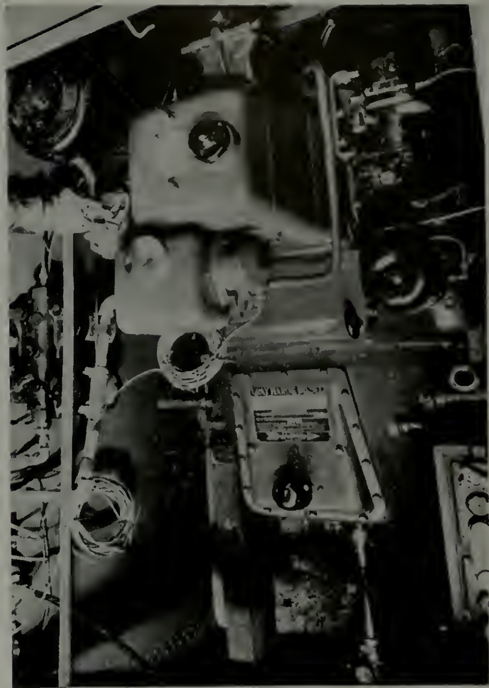
Still aft is the ballroom, a generally square room with a dome and circular dance floor in the center. The walls are of glazed aluminum leaf and mirrors, above a band of banquettes in deep rose.

The cabin class dining room on "A" deck is two full decks in height at the center, with side aisles one deck high. Here the colors are a soft cream and gold, with a black floor. The central portion of the room is divided into large panels of carved lacquer in tones of cream, soft gold and silver—for the upper half of the walls—with pilasters of cream marble for the full height forming piers at the side aisles.

The spacious swimming pool, with beach space on three sides, is entirely covered with tile except for the ceiling. The aft wall above the pool has a broad aluminum panel, upon which a metal decoration of porpoises and seaweed group around a large circular mirror as a central motive.

America's First Diesel Power Lifeboat

Three Unique Life-Saving Craft for Delta Line Passenger Liners



Gray marine diesel as installed in Welin 26-foot lifeboat.

America's first diesel-powered lifeboat, for use on one of the new passenger and cargo ships now being built by the United States Maritime Commission, has been launched at a Newark, N. J., shipyard, according to announcement.

Government requirements provide that at least one power lifeboat must be carried by each new American merchant ship of certain classes, and diesel power was selected because of its reliability, greater cruising range and the absence of fire hazard. First of these new lifeboats is powered by a one-cylinder, two-cycle Gray Marine General Motors diesel with a 1.6:1 reduction gear.

Use of the new power lifeboats is expected to help make Uncle Sam's new merchant marine fleet the safest in the world.

In case of disaster, it will be the function of the one power lifeboat on each ship to pick up the other lifeboats, which are hand-propelled, and take them in tow. Each of the diesel lifeboats carries thirty gallons of fuel oil, which is sufficient to propel the boat, fully loaded, a distance of approximately 150 miles in about twenty-four hours. The boats also are equipped with two-way short wave radio communication off of batteries. The advantage over the old type lifeboats are numerous. With radio aboard, the lifeboat crew can continue sending S.O.S. signals and direct ship searching for survivors. With sufficient power to tow other lifeboats, with any kind of luck, the survivors can all be kept in one group, making complete rescue much more certain. And, in case the ship sinks within 150 miles of land, the lifeboat can reach the shore, whether outside assistance comes or not.

Welin diesel-powered lifeboat on her trial run.

The new lifeboat, one of three built by the Welin Davit & Boat Corporation, is 26 feet long, 8 feet 4 inches beam, and has a capacity of 26 persons. These boats will be used on the Delorleans, Delbrasil and Delargentino, being built at the Sparrows Point Plant of the Shipbuilding Division of the Bethlehem Steel Company, Inc., for the Delta Line of Mississippi Shipping Company to run between New Orleans and South American ports.

On the Ways—
SHIPS IN THE MAKING
LATEST NEWS FROM AMERICAN SHIPYARDS

Newport News Delivers America

The Maritime Commission Trial Board on June 25 recommended to the Commission that S.S. America be accepted as a result of satisfactory trials conducted June 13, 14 and 15 off Rockland, Maine, and en route to Newport News, Virginia.

The report of the Trial Board said: "From observation and inspection during the trials, the Board considers that S.S. America is an outstanding accomplishment."

The first vessel to be ordered by the United States Maritime Commission in its building program, America was begun in October, 1937, and launched August 31, 1939. With capacity for 1219 passengers and a crew of 640, she is the largest merchant vessel ever constructed in the United States, and was built by the Newport News Shipbuilding and Dry Dock Company for the United States Lines. Since she was started, 158 other vessels have been ordered, of which 37 are already in operation.

America made better than 24 knots during her trial run, and her machinery exceeded the contract requirement of 34,000 shaft horsepower. During an overload run, she averaged approximately 38,500 shaft horsepower. The guaranteed fuel consumption figure was bettered in the standardization trials, and preliminary figures indicate that the contractor will be entitled to a bonus for constructing an economical power unit.

Three C-3s in the water at the Moore Dry Dock Co., Oakland, Calif. Sea Panther just launched, Sea Star at outfitting pier, Sea Arrow about ready for trials.

First Round-the-World C-3 Ship Launched

The first C-3 passenger and cargo type vessel in the Maritime Commission program, the S.S. President Jackson, was launched on June 7 at the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia.

This vessel is the first of a fleet of seven sister ships being built for the round-the-world service of the American President Lines. She was sponsored by Mrs. William Gibbs McAdoo, wife of the chairman of the steamship company.

Designed by the Maritime Commission, she will have accommodations for 98 passengers; an overall length of 492 feet; a beam of 69 feet, 6 inches; a speed of 16½ knots; and a gross measurement of 9300 tons.

Moore Dry Dock Delivers Sea Arrow

On the 25th, 26th and 27th of June the Moore Dry Dock Company held successful trials of the U. S. Maritime Commission C-3 cargo steamer Sea Arrow, and delivered her to the Commission.

This ship is acclaimed by everyone who inspects her as being a particularly well-finished and equipped cargo carrier. The workmanship is wonderful, the installation of equipment is shipshape, the performance of the power plant and of the ship is efficient and economical to a degree well in excess of guarantee.

This yard is busy with the C-3s Sea Star and Sea Panther, alongside the outfitting dock, and another C-3 taking shape on the building ways.

Twenty-two Vessels Ordered by Navy

On June 12 Acting Secretary of the Navy Lewis Compton announced allocations for the construction of 22 Naval vessels, 13 to U. S. Navy yards and 9 to private yards, for a total estimated cost of $327,233,000. This is said to be the largest peace-time order in the history of the U. S. Navy.

The allocation is as follows:

Two 10,000-ton cruisers—N. Y. Shipbuilding Corp.

Two 1630-ton destroyers — Bath Iron Works.

Two 1630-ton destroyers—Federal Shipbuilding and Dry Dock Co.

Three submarines—Electric Boat Company.

One 45,000-ton battleship—New York Navy Yard.

One 45,000-ton battleship—Philadelphia Navy Yard.

Two 1630-ton destroyers and two seaplane tenders — Boston Navy Yard.

Two 1630-ton destroyers—Charleston Navy Yard.

Three submarines — Portsmouth Navy Yard.

One submarine tender — Mare Island Navy Yard.

One mine sweeper, Norfolk Navy Yard.

Newport News Gets Order

The busy yard of the Newport News Shipbuilding and Dry Dock Company got an order in June to build a cargo ship for the International Freighting Corporation (a DuPont subsidiary). This vessel will be of the C-2 Maritime Commission design, modified to suit the special requirements of the operator in the run between United States and South American ports.

Bath Iron Works Gets Four Freighters

American Export Lines and the U. S. Maritime Commission on June 4 awarded a contract to the Bath Iron Works to build four of the Export Line type C-2 cargo vessels at a price of $2,198,000 (adjusted) per ship. These vessels have the following characteristics:

Length overall	473′ 1″
Beam	66′ 0″
Depth	42′ 3″
Gross measure	6700 tons
Displacement	14,450 tons
Total deadweight	8775 tons
Horsepower	8000
Speed	16½ knots

Bethlehem Gets Conversion Contract

On June 4 the U. S. Maritime Commission awarded a contract to the Sparrows Point Yard of the Shipbuilding Division, Bethlehem Steel Company, for the conversion of the freighter Edgemont into a training ship. The cost will be $1,644,640.

S.S. Edgemont is a Shipping Board cargo carrier built at Seattle, Washington, in 1919. She is 409.6 feet long, 54.2 feet beam, 27.1 feet depth, has a gross measurement of 6865 tons, a net measure of 5257 tons, and is fitted with 3000-shaft-horsepower geared turbines.

Sparrows Point Launches Tanker

Another addition was made to the fast-growing fleet of American tankers when the Esso Nashville was launched on June 15 at the Sparrows Point Yard of Bethlehem Steel Company, Shipbuilding Division. The new vessel, built for Standard Oil Company of New Jersey, was christened by Mrs. Hermon Sweeney Atchison, wife of the manager of the Baltimore branch, Stand-

Progress at Seattle-Tacoma Shipbuilding Corporation. Left: A stern frame in place. Right: The hulls of two C-1 cargo motorships on the ways.

ard Oil Company of New Jersey, Marine Division.

The Esso Nashville has an overall length of 463 ft., a molded breadth of 64 ft., a designed load draft of 28 ft., 4 in., and a deadweight of 13,000 tons. The tank capacity is 106,400 barrels, and is divided into 24 compartments, with adequate pumping capacity to load or unload the ship in less than 12 hours.

The propulsion machinery consists of a single screw installation of Bethlehem steam turbines, of 3500 shaft horsepower, capable of driving the vessel at a speed of 13 knots. Steam is supplied by two oil-fired water tube boilers.

The Esso Nashville represents the latest in tankship design. Extensive use of welding, and application of the Bethlehem - Frear system to longitudinals and bulkheads, insure a light, yet strong, framing with a substantial increase in paying deadweight for a given displacement.

The Maritime Commission June 28 announced that it had invited bids for construction of three single-screw, steam propelled, C-3 type passenger and cargo vessels for the American South African Line, Inc., of New York City.

Bids will be opened at 12:15 p.m., July 29, 1940, in Room 7856, Department of Commerce Building.

The vessels will be 492 feet long, 16½ knots designed speed, and will have accommodations for 111 passengers.

Alloy Iron in Marine Diesels

Four single screw cargo vessels of the C-2 type, of 13,900 tons displacement and 7,618 tons carrying capacity each, are being constructed for the U. S. Martime Commission by the Tampa (Florida) Shipbuilding and Engineering Co.

Each ship will be powered by two 9-cylinder 2-cycle diesel engines, rated 3,000 B.H.P. at 225 r.p.m., manufactured by Nordberg Mfg. Co., Milwaukee, Wis. The two engines, which are of the crosshead type, with 21″ x 29″ cylinders, are connected to the single propeller shaft through reduction gears and hydraulic couplings to give a propeller speed of 92 r.p.m.

Maritime Commission specifications state: *"Cylinder liners shall be made of the best grade of cast iron developed for this work, and shall be of a uniform and very hard structure, and capable of resisting heat and wear."*

To meet these requirements, the liners, weighing 2,400 pounds each, were cast by Nordberg in an alloy iron of somewhat different composition from the blocks, but also containing nickel and chromium. The tensile strength is in excess of 48,000 p.s.i., with 220/240 Brinell hardness.

The cylinder blocks, each weighing 7,000 pounds, with metal sections varying from 1″ to 4″, were furnished in a high-strength, close-grained, wear-resistant nickel-chromium cast iron, developing a minimum tensile strength of 45,000 p.s.i.

In addition to the well-known advantages of wear-resistance and strength, it is reported that tests on exposure to salt water corrosion show a distinct superiority for the alloy cast irons, which is an important added benefit in this application.

Type K-15 Bronze Double Sash Window

The Kawneer-Kearfoot Double Sash Window is supplied for single lift or double lift, the former shown on print KS-968A. This is made of extruded bronze, satin finish, with all necessary hardware and glazed with ⅜″ polished plate glass. The lower sash when fixed is sealed water-tight with felt. The upper sash slides on the outside and has a continuous felt gasket around four sides of the inboard face. This upper sash is fitted with two spring catches, and on each side and on the side frames there are two wedge blocks embossed, so spaced as to compress the felt gasket during the last ½″ motion in closing the sash. This makes practically a water-tight window. The window frames and sash are of .078 gage, extruded bronze, with the exception of the landing flange for attachment to the ship's plating which is ⅛″ thick. Metal toe glazing strips are used which do not require tap screws.

When desired, a metal sliding half screen is fitted on the inside. The window is of strong construction, of unusual compactness and precision with all corners welded.

The American

Pathfinder of the Seas

A Brief Account of the Services to Merchant Mariners of the Hydrographic Office, U. S. Navy

The Hydrographic Office of the Navy Department, ever since its establishment in 1830, has been charged with "the improvement of the means for navigating safely the vessels of the Navy and the mercantile marine."

Service rendered by this Office, and the resultant value of its investigations, have been in a large measure due to the enthusiastic and continued cooperation of the merchant marine. When Matthew Fontaine Maury, early in the history of the Hydrographic Office, began his studies of winds and currents, he called upon the merchant marine for assistance. From the mass of data submitted by the shipmasters of the sailing ships of that period, he was able to produce his famous wind and current charts (Pilot Charts). The result of his studies enabled shipmasters to cut the time of their voyages by many days and shipowners to save millions of dollars.

The cooperation of the merchant marine has continued to the present day. Hydrographic Office now has over 2,000 active observers in the merchant marine, constantly reporting on matters affecting the safety of navigation at sea. At the completion of each voyage, shipmasters forward to the Hydrographic Office complete reports of currents experienced, observations of sea and swell, and the temperature of sea water, together with accounts of ports visited and other data of assistance to the Hydrographic Office in fulfilling its mission to the merchant marine. In addition they immediately notify the office by radio of dangers menacing the sea routes, such as derelicts, wreckage, or ice.

In return for this cooperation, the Hydrographic Office is able to render many services to the shipmaster. Radio broadcasts describing dangers to shipping are sent out on regular schedules from the various naval radio stations of the United States and its possessions. Each day, through the medium of a daily memorandum, the mariner is advised of the latest changes in aids to navigation, obstructions reported and ice sighted. The Notice to Mariners, published weekly, furnishes him with the necessary information to keep his charts and publications corrected, while the Hydrographic Bulletin, also issued weekly, contains much information of general interest to the maritime world.

Monthly the mariner receives what is probably the best-known of all Hydrographic Office publications—The Pilot Charts. These charts, covering all oceans, contain a wealth of information relating to the winds and currents to be expected, the recommended routes for the month, together with average weather conditions and many other features to assist him in making safe and expeditious passages. These charts, especially, are a monument to the splendid cooperation of the merchant marine, for the meteorological and oceanographical data compiled, and are constantly refreshed, from the millions of observations taken by the personnel of that service.

In addition to periodicals, the Hydrographic Office issues many publications for the safe navigation of the merchant marine in foreign waters. The coasts of the world and its harbors are described in the 55 volumes of Sailing Directions published by the Office. Every navigation light, excluding those of the United States, is shown in 6 volumes of Light Lists, while all radio stations rendering services to shipping are listed in 2 volumes of Radio Aids to Navigation. Here again the Hydrographic Office receives the cooperation of the merchant marine, through the constant flow of material which is utilized in keeping these publications up to date.

To facilitate closer contact and cooperation with the individual mariner, not only in the American merchant marine, but on board the thousands of foreign merchant vessels that annually visit our shores, Branch Hydrographic Offices are maintained in all the principal seaports of continental United States, San Juan, Honolulu, the Panama Canal and on the Great Lakes.

The merchant marine, and the country in general, can well be proud of the splendid record established by the Hydrographic Office. As an integral part of the United States Navy, it has pioneered in advancing many branches relating to the sciences of hydrography and navigation, so that today its leadership in these fields is recognized throughout the world.

In hydrographic surveying, the Hydrographic Office was the first to employ the sonic sounding apparatus, and to utilize aerial photography. Among the improvements introduced in chart production may be mentioned the invention and development of the map and chart pantograver; the adoption of the offset lithographic printing press; the application of photography in chart photo-reproduction; and the

use of additional colors in the printing of charts. All these advances have resulted in the production for the merchant marine of a most accurate and modern nautical chart, which is so recognized by the maritime world.

The science of navigation, so vital to the merchant marine, has also been progressively improved by the Hydrographic Office.

"The American Practical Navigator," originally published by Nathaniel Bowditch, a shipmaster of Salem, Mass., has been expanded and enlarged upon by the Hydrographic Office since 1866. Today *"Bowditch,"* or the *"Sailor's Bible,"* as it is affectionately known, is the standard textbook on navigation, not only in the American merchant marine but also in the merchant fleets of many foreign nations.

In the realm of celestial navigation, "The Line of Position" method, originally discovered by the American shipmaster Thomas H. Sumner, has been carried forward by the Hydrographic Office, keeping pace with the ever-increasing demand for more speed and accuracy in solution, necessitated by the high speeds in ocean transportation today. Among the better-known developments of this method, published by the Hydrographic Office and widely used in the merchant marine today, are those of Dreisenstock and of Ageton. At the present time the Office is issuing a new series of tables under the title of *"H. O. 214, Tables of Computed Altitude and Azimuth,"* which represents the most advanced method yet devised for determining a ship's position at sea. This is but another service of the Hydrographic Office contributing to the safety of navigation for the merchant marine upon the high seas.

The Hydrographic Office stands today as a most vital adjunct to the merchant marine, safeguarding that service "upon its lawful occasions upon the sea", by providing the necessary charts, publications, radio advice and all such other assistance that modern ingenuity can devise. Through a century of progress it can be truly said that the Hydrographic Office has been "The Pathfinder of the Seas."

Chief Constructor, U. S. Coast Guard, Retires

Commander Frederick Allen Hunnewell

Having reached the statutory age limit, Commander Frederick Allen Hunnewell, Chief Constructor, United States Coast Guard, retired on July 1.

He was: born in Somerville, Mass., on June 12, 1876; in 1897 graduated with the degree of S.B., course in Naval Architecture, from the Massachusetts Institute of Technology; and was employed in the Superintending Constructor's office, United States Navy, Newport News, Virginia, during the construction of gunboats and battleships comprising early units of the Navy. In 1900 he was transferred to the Navy Department, Washington, D. C., and assigned to specifications and contract plans for contemplated cruisers.

In 1902 he was ordered to the New York Shipbuilding Company, Camden, New Jersey, as chief draftsman in the Navy office at that plant.

On a competitive examination, he was appointed a Constructor in the Coast Guard (then Revenue Cutter Service) on August 29, 1913, with the rank of lieutenant. Promoted to the rank of lieutenant commander in 1923, and to his present rank of commander in 1933, Frederick A. Hunnewell has been directly concerned with the design, construction, maintenance and repair of all classes of cutters and boats which form the Coast Guard fleet.

For his ability and untiring efforts in the advancement of engineering knowledge and practice and the maintenance of high professional standards, and for exceptional service of meritorious character, Chief Constructor Hunnewell retired with the appreciation, esteem and good wishes of the entire profession and of his associate Coast Guard officers.

A member of the Society of Naval Architects and Marine Engineers, past president of the Washington Society of Engineers, and a member of the Cosmos Club of Washington, D. C., he represented the United States Coast Guard at the International Conference of Naval Architects and Marine Engineers, London, England, 1938, and has contributed technical articles to the U. S. Naval Institute Proceedings, the Transactions of the Society of Naval Architects and Marine Engineers, and other publications.

William H. Berg

The sudden passing of William H. Berg, President of the Standard Oil Company of California, has left a large gap in the ranks of our great industrialists.

The Pacific Coast Oil Industry has lost a great executive.

The forces for civic betterment will be missing a powerful leader.

The Pacific American merchant marine will be mourning a true friend.

PACIFIC MARINE

Reviews

Golden Anniversary for Tubbs Executive

On April 1, 1890, a clear-eyed, clear thinking young man joined the sales staff of the San Francisco headquarters of Tubbs Cordage Company, pioneer rope manufacturers of the West.

One of the first assignments given this young man, **Edward Everett**, was the coverage of the newly developed oil fields in California and, a few years later, the fields throughout the Mid-Continent. From almost the first days when the abundance of "black gold" began to flow, Edward Everett was a familiar figure among the growing acres of derricks, helping and advising in the selection of cordage best suited for the difficult tasks of early drilling.

In a comparatively short number of years, Edward Everett's energy and zeal received its recognition. He was recalled from the field and appointed as General Manager of Tubbs Cordage Company, with headquarters in San Francisco.

But another recognition of the important part Everett had played in the development and standardization of oil field cordage was to be his. He became one of the pioneer members of the A. P. I. committee on specifications for oil field rope and for nearly half a century has been recognized as one of the country's outstanding authorities in this field.

Among his hobbies, Everett still maintains his love of fishing. At one time, he was one of the champion dry fly casters of the United States, and even yet can lure the most wary trout to his creel.

EDWARD EVERETT

Today, after fifty years of service, Everett still is actively in the harness. From his residence in Palo Alto, he daily commutes to the Tubbs Cordage Company general offices at 200 Bush Street, San Francisco, where the "youngsters" of lesser service call on him for advice and assistance with cordage problems.

S. F. Sales Agency Appointed

Frank Groves Company, 136 South Park, San Francisco, California, has been appointed exclusive agents for The New Jersey Asbestos Company, for the distribution of their products in San Francisco and vicinity.

The New Jersey Asbestos Company, which was established in 1891, manufactures a complete line of Mechanical Engine Packings, which are sold under the following trade names:

"Gladiator" Gaskets and Piston Rod Packings.

"V" Pilot Semi-Metallic Packings.

Genuine "Woodite" Piston Rings.

Frank Groves Company will carry in their San Francisco Warehouse, a full and complete stock of all types of these packings, and will be in a position to render first-class service to all clients.

Pacific Republics Line

In line with the "Good Neighbor Policy" and to provide the necessary link in the tie between the nations of the western hemisphere, Moore-McCormack Lines Inc. maintain a Trade Development Bureau which acts as a clearing house for United States firms seeking trade outlets or sources in South America. The same service is rendered South American east coast neighbors, who are endeavoring to find new markets for products in this country.

This enterprise, new to the shippers and importers on the west coast, should provide the necessary and immediate assistance to find the long sought connections on the east coast of South America.

This important undertaking, designed to develop new business heretofore not considered by the American market, does not purport to replace nor disturb old established associations and agencies organized to further the cause of American Commerce. To the contrary, every effort is being made to encourage and cooperate with all firms, old or new, carrying on business between the two Americas.

In the light of world conditions, the United States should turn to South America as an outlet for manufactured products, but this business cannot be

a one way trade affair. We must thoroughly investigate our own resources to determine what South America has to offer our industries. Brazil and the Argentine are recognized agricultural countries with unexploited sources of raw materials. The export possibilities of those two countries, if developed, could easily meet any emergency.

Moore-McCormack Lines' representatives in the countries of South America, are under instructions to consult with buyers and shippers who find themselves cut off from their former markets. Particulars concerning the merchandise and other details are obtained and forwarded to the head office in New York, which proceeds to find suitable connections.

Brazilian and Argentine agents and distributors who formerly represented European firms are now turning to the United States for their steel products in general, including heavy machinery, sheets, rods and wire. Other important requests are for chemicals, yarns, woodpulp, newsprint paper, codfish and smoked salmon. Inquiries also cover flashlights, alarm clocks, small tools, hardware novelties, pearl buttons, imitation leather and canned goods.

Inquiries from Brazilian and Argentine exporters received by the Trade Development Bureau cover a wide variety of products including hides and skins, ores, oil bearing seeds and nuts, vegetable oils, casein, carnauba wax, fibers, mandioca flour, bananas and other fruits.

Joins Sperry

The appointment of **Col. Hugh Knerr,** formerly of the United States Army Air Corps, as a Special Consultant to the Sperry Gyroscope Company is announced by R. E. Gillmor, President.

Due to his wide experience and background as an officer of the Coast Artillery, as an Air Corps officer and also as an officer of the United States Navy, Col. Knerr is particularly well qualified to act as a consultant to the heads of the Marine, Aeronautical and other departments of the Sperry organization.

Col. Knerr will advise the company as to objectives in its extensive research and development program and as to the company's organization and facilities for training customer personnel in the use, care and repair of its products.

COL. HUGH KNEER

A native of Iowa, Col. Knerr is a graduate of the United States Naval Academy. A few years after his graduation from the Academy, he accepted a commission as a Second Lieutenant, Coast Artillery Corps, United States Army.

After several tours of duty with the Coast Artillery Corps, Col. Knerr served at the Aviation School, Rockwell Field, California. Later he was Engineer Officer at Park Field, Tennessee, Engineer Officer, Gerstner Field, Louisiana, Department Air Officer, Luke Field, Hawaii. Returning to the United States, he was assigned as Assistant Engineer Officer at McCook Field, Ohio. Subsequently he commanded the Second Bombardment Group, Langley Field, Virginia. He is a graduate of the Air Service Tactical School, the Command and General Staff School and the War College. Later he served as Chief of the Field Service Section of the Air Corps, Material Division, Wright Field. In 1935 he assumed duties as Chief of Staff of the G. H. Q. Air Force, Langley Field, Virginia, at the time this important military organization was formed. In April, 1939, he was retired from the United States Army Air Corps.

Todd Election

John D. Reilly was reelected on June 19 president of Todd Shipyards Corporation for his ninth consecutive term by the Directors of the Corporation at their meeting at 1 Broadway, New York, following the annual meeting of stockholders.

Mr. Reilly has served continuously as President of Todd Shipyards Corporation since the Spring of 1932 when he was elected to that office following the death of William H. Todd.

Todd Shipyards Corporation comprises Robins Dry Dock & Repair Co., Erie Basin, Brooklyn, N. Y.; Tietjen & Lang Dry Dock Company, Hoboken, N. J.; Todd Combustion Equipment, Inc., 601 West 26th Street, New York City; Todd Galveston Dry Docks Inc., Galveston, Texas; Todd Seattle Dry Docks Inc., Seattle, Washington and Todd-Johnson Dry Docks Inc., New Orleans, La.; Todd Oil Burners, Ltd. of London, England is the British affiliate and the Seattle-Tacoma Shipbuilding Corporation, Tacoma, Wash., the Pacific Coast affiliate of the Corporation.

Other officers elected at this meeting included:

Todd Shipyards Corporation — J. Herbert Todd, George G. Raymond and Joseph Haag, Jr., Vice-Presidents; William A. Maloney, Vice-President in Charge of Sales; C. H. M. Jones, Assistant to President; Charles F. Strenz, Treasurer; Edward W. Costello, Assistant Treasurer; F. J. Smyth, Secretary; E. K. Linon, Assistant Secretary; F. X. Riordan, Assistant Secretary and Assistant Treasurer; E. P. Enfer, Comptroller; William J. Sammon, Assistant Comptroller. The Directors are John D. Reilly, E. P. Enfer, George G. Raymond, Francis J. Gilbride, J. Herbert Todd, Joseph Haag, Jr., William A. Maloney and F. D. Hesley.

News of the Propeller Clubs of the United States

National Propeller Club Convention, New Orleans

Elaborate preparations for entertainment of delegates to the national convention of the Propeller Club of the United States and Merchant Marine Conference, to be held in New Orleans on December 8-11, have been initiated, according to **General Chairman Louis B. Pate,** who anticipates the coming meeting will prove memorable in all aspects. The problems of the American shipping industry, he said, are always productive of much serious discussions in these conventions, and in view of present and prospective world conditions the New Orleans session may cause even graver deliberations. At the same time, it is recognized that relaxation has a valuable part in progress and the members of the Propeller Club of New Orleans expect to achieve an acme in that direction.

Delegates who arrive on Sunday, December 8, will be guests of the Propeller Club of New Orleans at an "open house," featuring a buffet supper and a night club show that night.

On the following afternoon (Monday, 9th), they will be given an opportunity to test their skill in a golf tournament on one of New Orleans' championship courses. The National President's reception and dance will be held on Monday night.

At Tuesday noon, there will be a luncheon tendered in one of New Orleans' famed French restaurants in honor of the convention's distinguished guests. The annual grand ball and banquet will be held on Tuesday night.

An excellent opportunity to view the New Orleans' harbor will be provided on Wednesday afternoon, it being planned to take the delegates on a harbor trip. For those who desire to view the famed "Acadian" Bayou Teche country, there will be an all-day tour arranged for Thursday, which will possibly include a visit to a sugar mill in operation.

In addition to the formal events enumerated, there will be special entertainment for the ladies who, among other interesting events, will be given a glimpse of the Vieux Carre — the "Old New Orleans."

Port of Tacoma

June 18, 1940

Pacific Marine Review,
500 Sansome Street,
San Francisco, California

Dear Mr. De Rochie:

Thank you for the publicity given the Propeller Club, Port of Tacoma, in the June issue of the Pacific Marine Review.

We received the page from this periodical which included the information regarding our last Club meeting and wish to express our appreciation for giving us a column.

Our Club meetings have been suspended for the summer months, to resume the third Tuesday of September. We will then furnish you with further publicity in connection with our monthly meetings.

Sincerely,
Charles C. Cramp,
The Propeller Club of the United States
Port of Tacoma

Port of Los Angeles

Rather than import a speaker from the east or any other section of the country for National Maritime Day luncheon, The Propeller Club of the U. S., Port of Los Angeles No. 66, this year selected one of its own members, Mr. Edgar M. Wilson, Second Vice President of this Port, as principal speaker.

The idea proved to be a great success. Mr. Wilson gave an excellent and interesting talk on the American Merchant Marine. He touched particularly upon the traditions which were not commonly known either to our members or to the members of the Kiwanis Club of Los Angeles which joined our Port in observing National Maritime Day.

The Propeller Club, Port of Los Angeles No. 66, is fostering the establishment of a revolving fund to be loaned to worthy cadets of the California Maritime Training Academy. These loans will be made only to students who have started their training and have proved their merit and ability but who may not be able to continue because of unexpected financial difficulties.

The next meeting of The Propeller Culb, Port of Los Angeles No. 66, was held Wednesday, June 26th, at the California Yacht Club, Wilmington. One of the features of this meeting was the election of officers for the year 1940-41 and the election of Governors to fill the vacancies on the Board.

Port of Houston

A hundred and fifty Houston shipping men cheered lustily when **Arthur M. Tode,** Honorary President of the Propeller Club of the United States, presented the charter to the Propeller Club, Port of Houston following a dinner meeting of this Club held in the Hotel Rice on June 12th. The Propeller Club, Port of Houston is the seventy-third "Port" admitted to membership in the Propeller Club of the United States.

Organization work seeking the establishment of a strong Propeller Club in Houston had proceeded for some time under the guidance of **L. B. Pate,** National Vice President of the Propeller Club of the United States and Vice President of the Mississippi Shipping Company at New Orleans, together with **B. M. Bloomfield,** Vice President of Lykes Bros. Steamship Company, Inc., at Houston. The remarkable growth of Houston over the past few years made

This illustration shows a corner of the shop of the Cochrane Corporation, and features at right and rear four Monel Metal de-aerating heaters for U. S. Navy destroyers, and at left 3 deaerating heaters for C-3 ships.

it a logical place for organizing a Propeller Club to promote, further and support American shipping. The first ship to sail from Houston for a foreign port left in November 1919 and the Port of Houston has since that time rapidly advanced to a position where it is now the second Port of the United States in deep sea tonnage; certainly a wonderful accomplishment over a period of only twenty years.

In his address before the charter members of the Propeller Club, Port of Houston, Honorary President Tode stressed the importance of a powerful merchant marine and reviewed the efforts of the Propeller Club of the United States over the past years.

In the absence of **President Ben F. Thompson** of the Propeller Club, Port of Houston, the charter was accepted by **Judge J. Newton Rayzor,** member of the Board of Governors.

Officers and members of the Board of Governors elected at the organization meeting of the Propeller Club, Port of Houston, held on May 22nd, are:

PROPELLER CLUB, PORT OF HOUSTON, TEXAS (Port No. 73) OFFICERS

President: Mr. B. F. Thompson, Vice President, Lykes-Coastwise Line, Inc.

Vice President: Mr. H. J. Luhn, Vice President, Long Beach Shipside Terminal Co.

Secretary: Capt. R. L. Wynne, Surveyor, Board of Underwriters of New York.

Treasurer: Mr. Robert J. Wales, Manager, Houston Towing Co.

Governors: Mr. J. R. Bencal, Surveyor, U. S. Salvage Association; Mr. Paul E. Taft, Assistant to the President, Duncan Coffee Co.; Mr. Thurman G. Frazee, 1302 Petroleum Bldg.; Mr. B. M. Bloomfield, Vice President, Lykes Bros. Steamship Co.; Mr. R. A. Fenzl, President, Harrisburg Machine Co.; Mr. J. Newton Rayzor, Royston & Rayzor.

OFFICERS AND BOARD OF GOVERNORS
AT PRESENTATION OF CHARTER BY THE PROPELLER CLUB OF THE UNITED STATES TO PROPELLER CLUB, PORT OF HOUSTON, TEXAS (PORT NO. 73)

Hotel Rice, Houston, Texas, June 12th, 1940

FRONT ROW, Left to Right: R. A. Fenzl, Governor, P.C., Port of Houston (Harrisburg Machine Company); J. Newton Rayzor, Governor, P.C., Port of Houston (Attorney); Harry W. Parsons, Past National President, Propeller Club of the United States; Arthur M. Tode, Honorary President, Propeller Club of the United States; Harrison J. Luhn, Vice-President, P.C., Port of Houston (Long Beach Shipside Terminal Co.); Paul E. Taft, Governor, P.C., Port of Houston (Duncan Coffee Co.).

REAR ROW, Left to Right: Robert J. Wales, Treasurer, P.C., Port of Houston (Houston Towing Company); J. R. Bencal, Governor, P.C., Port of Houston (U. S. Salvage Association); T. G. Frazee, Governor, P.C., Port of Houston (T. G. Frazee Co.); Benjamin M. Bloomfield, Governor, P.C., Port of Houston (Lykes Bros. Steamship Co.).

MISSING: B. F. Thompson, President, Propeller Club, Port of Houston (Lykes Coastwise Line, Inc.); Captain R. L. Wynne, Secretary, Propeller Club, Port of Houston (Board of Underwriters of New York).

George Metcalf is Mourned

Word of the sudden passing of Lester George Metcalf, manager of marine operations for Union Oil Company, came as a distinct shock to his many business associates and acquaintances in Pacific Coast oil and shipping circles. Totally unexpected, Mr. Metcalf's death was caused by a heart attack in the early morning of June 6th.

Respected and loved by all who came in contact with his genial personality, "Met," as he was affectionately known to his friends, was an individual of tremendous capabilities. Aggressive in the performance of his duties, he always maintained a genuine interest in the other fellow's viewpoint. He was noted for his extreme fairness in the handling of employee problems.

A native California son, "Met" was born on September 17, 1887, in Santa Barbara. During his undergraduate days at Pomona College, he earned an enviable scholastic reputation, as well as that of an all around athlete. Graduating from Pomona with the class of 1908, he completed his formal education in 1912, graduating as a mechanical engineer from the Massachusetts Institute of Technology.

"Met" first became associated with Union Oil Company in 1914 as an engineer in the pipe line division. In 1920, after serving eighteen months as a captain in the United States army, he became superintendent of the company's Oleum refinery. Six years later he was transferred to Los Angeles, assuming the duties and responsibilities of assistant manager of refineries. He became manager of refineries in 1930. Prior to his appointment last year as manager of marine operations, he served as manager of manufacturing. During the past year he ably directed the company's tanker fleet replacement program.

Steady As You Go!

(Continued from page 55)

most liable to spontaneous combustion?

ANSWER

When the coal is subject to breakage during transport from shore to ship; when coal which is bituminous is shipped in a wet condition; and especially when the ventilation is through the body of the coal cargo.

QUESTION

In fine weather, what would you do with a cargo of coal?

ANSWER

Keep the hatch covers off, whenever possible.

QUESTION

What precaution should always be adopted with coal cargoes during long voyages?

ANSWER

The temperatures of the various portions of the cargo should be tested periodically by thermometers, and registered in the log.

QUESTION

How would you get the temperature of lower holds?

ANSWER

By lowering the thermometer down a pipe or tube.

QUESTION

Besides the hatches, what other means must be adopted for relieving the gases from the surface?

ANSWER

There must be ventilators giving free and continuous egress to the open air in all states of the weather.

QUESTION

How is the natural ventilation of holds greatly assisted by derrick or samson posts when suitably adapted for that purpose?

ANSWER

The natural ventilation of holds is greatly assisted by derrick or samson posts, i.e., when suitably adapted for that purpose. These, as well as lower masts fitted with swan necks below cross trees, on account of the high elevation of their outlets, make excellent uptakes. Posts intended to act in this capacity should preferably be connected with the lower holds.

Often, however, the undoubted utility of this means of exhausting holds of heated air, etc., is lost at a time when it is most needed, owing to posts being fitted with flat covers (usually operated by a threaded spindle), which must be closed to exclude rain, snow and spray.

QUESTION

Is ventilation provided for bilges when a ship is fully loaded? Give reasons.

ANSWER

Yes, ventilation is provided for bilges, when the ship is fully loaded, by means of the air pipes which extend to the upper deck, because when certain types of cargo find their way into the bilges and get wet they give off strong, offensive odors, which, if not got rid of, may contaminate other cargoes susceptible to these odors, and rendered useless by them.

QUESTION

Is ventilation provided to water ballast tanks; if so, in what manner?

ANSWER

There is no direct method of ventilating ballast tanks except by the air-pipes which are fitted to allow the air to escape whilst they are being filled, and to allow it to enter whilst they are being pumped out.

QUESTION

What are the Bureau requirements for venting of cargo tanks on new tank vessels?

ANSWER

(A) Each cargo tank of a tank vessel shall be equipped with a vent.

(B) Cargo tanks in which Grade A liquids are to be transported shall be fitted with a venting system consisting of a branch vent line from each cargo tank connected to a vent header, which shall extend to a reasonable height above the weather deck and be fitted with a flame arrester or pressure-vacuum relief valve at the outlet to the atmosphere. Each branch vent line may be provided with a manually-operated control valve, provided it is bypassed with a pressure-vacuum relief valve, or each cargo tank to which such a branch vent line is connected is fitted with an independent pressure-vacuum relief valve.

In barges with independent tanks carrying Grade A liquids, separate discharge pipes may be fitted to each pressure-vacuum relief valve and carried to a reasonable height above deck.

(C) Cargo tanks in which Grades B and C liquids are to be transported shall be fitted with a venting system consisting of branch vent lines connected to a vent header, which shall extend to a reasonable height above the weather deck and be fitted with a flame arrester or a pressure-vacuum relief valve at the outlet to the atmosphere.

(D) Cargo tanks in which Grades D and E liquids only are to be transported shall be fitted with goosenecked vents and flame screens, unless such tanks are vented by pressure-vacuum relief valves or venting system of branch vent lines and a vent header.

QUESTION

What constitutes efficient ventilation in the pump rooms and compartments containing machinery where sources of vapor ignition are normally present?

ANSWER

Pump rooms and compartments containing machinery where sources of vapor ignition are normally present shall be ventilated in such a way as to remove vapors from points near the floor level or the bilges. Effective steam- or air-actuated gas ejectors, or blowers or ventilators fitted with heads for natural ventilation, will be approved for this purpose.

Your Problems Answered

(Continued from page 53)

low for thinning of the metal at bends and for nicks or scars in working tubes. Furthermore, an empirical amount is deducted from the calculated value to allow for stresses due to unusual conditions, such as rapid temperature changes, overheating from internal scale, erosion and corrosion on both the fire side and the water side.

Since the load in the metal reduces so rapidly as we reduce the radius, extremely thin tube walls will hold very high pressures, so that when using very small tubes empirical adjustments to the formulas are necessary or the tube walls will be too thin for practical purposes.

For instance, if we arbitrarily say that the **S** will be 54,000 lbs. per sq. in., **F** will be **6**. That we must deduct .039 inches from measured thickness and 250 lbs. per sq. in. from the final answer. Having no riveted joint, **E** will be **1.0**. Then our formula will be:

$$W = \frac{STE}{RF} = \frac{54{,}000\ (T - .039) \times 1}{R \times 6} - 250,$$

or, since $D = 2 \times R$, then

$$W = \frac{18{,}000\ (T - .039)}{D} - 250.$$

This, we will note, is the formula in General Rules and Regulations, page 82. And we calculate that a 2-inch outside diameter tube with wall thicknesss of only .148 inch will have a safe working pressure allowable of 731 lbs. per sq. in.

Our next article will discuss formulas for allowing for holes drilled for tubes in drums or sheets.

Engineers' Licenses for May

Name and Grade	Class	Condition
SAN FRANCISCO		
G. Moran, Chief	SS, any GT	RG
H. E. Olson, Chief	SS, any GT	RG
R. W. Barker, 1st Asst.	SS, any GT	RG
C. J. Henderson, 1st Asst.	SS, any GT	RG
C. B. Livingston, 1st Asst.	SS, any GT	RG
R. J. Sauer, 1st Asst.	SS, any GT	RG
A. W. MacLaren, 2nd Asst.	SS, any GT	RG
G. S. Pearson, 2nd Asst.	SS, any GT	RG
A. Fel[illegible]entreff, 2nd Asst.	SS, any GT	O
R. S. Randall, 2nd Asst.	SS, any GT	O
W. F. Chapman, 3d Asst.	SS, any GT	O
A. E. Gallant, Jr., 3d Asst.	SS, any GT	O
F. C. Gilchrist, 3d Asst.	SS, any GT	O
M. H. Graefe, 3d Asst.	SS, any GT	O
R. H. Greer, 3d Asst.	SS, any GT	O
D. M. Haas, 3d Asst.	SS, any GT	O
G. T. Haddon, 3d Asst.	SS, any GT	O
R. F. McGuire, 3d Asst.	SS, any GT	O
W. J. Peck, 3d Asst.	SS, any GT	O
R. C. Puckett, 3d Asst.	SS, any GT	O
J. E. Shreve, Jr., 3d Asst.	SS, any GT	O
S. Smullen, 3d Asst.	SS, any GT	O
R. R. Snyder, 3d Asst.	SS, any GT	O
W. E. Trantum, 3d Asst.	SS, any GT	O
PORTLAND		
P. A. Anderson, 1st Asst.	SS, any GT	RG
A. L. Hendrickson, 1st Asst.	SS, any GT	RG
SAN PEDRO		
P. K. Wright, Chief	SS, any GT	RG
R. G. Kennedy, 3d Asst.	SS, any GT	O
J. L. Reeish, 3d Asst.	SS, any GT	O
W. R. Kerr, Jr., Chief	MS, 2500 GT	RG
SEATTLE		
E. B. Balcom, Chief	MS, any GT	O
B. M. Cecil, Chief	MS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

LETTERS FROM THE SHIPS

J. C. H., San Francisco:

Thank you for your kind expression.

Yes, you need practice in doing problems, but look around you on your ship. You have a million-dollar textbook right under your feet. Study it. Calculate everything you can about it. Find what the thickness of the drums should be, what load on piston rod of auxiliary feed pump. What rate of delivery of water by it. What diameter of cylinder head bolts should be used there. Calculate thickness of main steam pipe, auxiliary steam pipes. Does the fire-fighting equipment meet with the General Rules and Regulations?

Imagine yourself an inspector for the Bureau, stepping aboard and passing or rejecting every single item of equipment. Do not pass it just because you know it has been working, or some other inspector passed; you check it against the written law and specification. Be extremely curious about every fitting, every machine, every unit; learn the why and how of each. Calculate whatever you can about it. You will be gratefully surprised at how much learning is contained in *your ship*.

"The Chief."

Building in American Yards

Direct Reports from Yards as of June 1, 1940.

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Five C-1 cargo vessels for U. S. Maritime Commission. Full scantling steam propulsion type. Keel for second ship laid March 4, 1940. First ship launching date August 6, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Matsonia, Aztec, Arkansan, Dredge Golden Gate, San Jose, Thorhild, Toltec, Anna Knudsen, Makiki, Maya, Yorkmar, U. S. S. Colorado, U. S. S. West Virginia, Admiral Cole, Associated, Admiral Chase, Admiral Day, D. G. Scofield.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 20' x 60' steel gasoline barge for U. S. Engineers, Bonneville, Ore. Completion about July 1, 1940.

DRYDOCK AND ROUTINE REPAIRS:

A. Mackenzie, Villanger.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. Keel laying dates June 3, June 17, December 9, 1940, and March 5, 1941; launching dates November 25, 1940, and February 19, April 28 and July 24, 1941; delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 55-foot ketch-rig yacht.

DRYDOCK AND ROUTINE REPAIRS:

Dwyn Wen, Hispaniola, Bali, Lebec, Phantom, Petrel, North Star; 42 small sail and power yachts and commercial boats.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Schiller Street
Alameda, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Makena, Admiral Cole, Star of Finland, Port Costa, Dredge Golden Gate, Solano.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners; length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 H.P.; 10 knots speed; cost $160,000. Delivery date October, 1940.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Canco, Cornelia, Manzinata, Boxer, 14 cannery boats, Alaska Pacific Packing Co. fleet, Norco.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Tidewater Associated Barge No. 6, Lurline Burns, Cascade, U. S. C. G. C. Itasca, Avalon, Cathwood, G/B Phoenix, G/B Princess, Western Oil Barge No. 1, Emidio, Catalina, Sydhav, W. H. Berg, Baldhill.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939. Keel laid, No. Y044, April 1, 1940.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Boise, Nashville, Chester, McFarland, Dorsey, Elliot, Balch, Maury, McCall, Moffett, Pinola, YO-24, Eagle No. 32, Tippecanoe, Avocet, Seal, Stingray.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6", SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. No. 195 launched September 15, 1939; No. 196 launched December 22, 1939.

Hulls Nos. 197 and 198, two C-3 vessels for U. S. Maritime Commission LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6". Keel laid, No. 197, February 5, 1940, launched June 11, 1940.

DRYDOCK AND ROUTINE REPAIRS:

President Wilson, El Capitan, Silvermaple, Wilhelmina, Iowan, Oliver Lyman, Mahukona, Star of Monterey, Arkansan, Arizonan, Dredge S. G. Hindes, Paul Shoup, Meigs, Santa Fe Barge No. 5, Coalinga, Eureka, Kansan, Jackie Boy, Mathew Luckenbach, Pennsylvanian, President Garfield, Sobre Los Olas, Florence Luckenbach, Cadaretta, Crowley Barge No. 2, K. I. Luckenbach, Blue Water, Despatch No. 7, Barge No. 93, General Frank J. Bell, S. C. T. Dodd, Yamazato Maru, Redline, Modjokerto, Ito, Minnesotan, Kota Radja, Flying Cloud, Sea Arrow, Hawaiian Standard.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Launched May 16, 1940.

Monssen (Destroyer No. DD436). Launched May 16, 1940.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10), seaplane tender; keel laid October 27, 1939.

Biscayne (AVP11), seaplane tender; keel laid October 27, 1939.

Casco (AVP12), seaplane tender; keel laid May 30, 1940.

Mackinac (AVP13), seaplane tender; keel laid May 30, 1940.

SEATTLE-TACOMA SHIPBUILDING CORP.
1801-16th Ave., Southwest
Seattle, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. Keel laying dates, March 5, April 15, August 26, September 26, 1940, and February 26, 1941. Launching dates, August 1, September 1, 1940, and February 1, March 1,


RUST
is a PIRATE


ROUGH! TOUGH! and READY!


S. S. LURLINE • S. S. MARIPOSA
S. S. MONTEREY • S. S. MATSONIA
Matson Line to Hawaii
NEW ZEALAND·AUSTRALIA

July 1, 1941. Delivery dates, January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Tugs Goliah, Neptune, Prosper and Tyee; Otsego, Columbia, Walter A. Luckenbach, Mathew Luckenbach, California Express, British Columbia Express, Boschfontein, Kalakala, Salacia, Capillo, Sutherland, Herman F. Whiton, Northland, Aleutian, Phaeax, Dredge Dan C. Kingman, Standard Service, West Ira, Utacarbon.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, Western Pacific, bait boat for tuna fishing for Western Pacific Co., San Diego, Calif.; 100' x 26'; 350-H.P. Superior engine. **Delivery date, July 1, 1940.**

Hull No. 142, St. Francis, purse seine fishing boat for Hubert Ursich, Tacoma, Wash.; 93' x 24'; 380-H.P. Enterprise engine. **Delivery date, July 1, 1940.**

Hull No. 143, purse seine fishing boat for Spiro Babich, Gig Harbor, Wash.; 95' x 25'; 400-H.P. Atlas engine. **Launching date, June 1, 1940.**

DRYDOCK AND ROUTINE REPAIRS:

Tug Madrona, Tacoma Fireboat, Fishing Boats Helen L. Christine, Western Chief, Progress, Western Flyer and New Mexico.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. Keel laying dates, February 5, February 19, August 15, November 10, 1940; and March 1, 1941. Launching dates, August 1, August 31, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Eight coal barges 175' x 26' x 11' for Carnegie-Illinois Steel Co.

Three oil barges 240' x 50' x 12' for Campbell Transportation Co., Pittsburgh, Pa.

Four sand barges 148' x 36' x 15' 6" for Panama Canal.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 177 and 178, DD423, Gleaves, and DD424, Niblack, two 1620-ton destroyers for U. S. Navy. **Delivery dates June and** August, 1940, respectively.

Hulls Nos. 180-181, DD429, Livermore, and DD430, Eberle, two 1620 ton destroyers for U. S. Navy. Delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437, Woolsey, and DD438, Ludlow, two 1620-ton destroyers for U. S. Navy. Delivery dates, June 15, 1941, and August 15, 1941.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy. Launched November 15, 1939, and March 26, 1940.

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S. Navy. Keels laid March 27 and May 15, 1940.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450' B.P. x 66' x 42' 3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons.

Hulls Nos. 1485-1487, three tankers 502' x 68' x 37'; 21,000 tons.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co.; 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co.; 15,450 tons dwt.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hulls Nos. 4330, Esso Annapolis; and 4331, Esso Albany; two 16,300 dwt. ton tankers for Standard Oil Co. of N. J.; 18 knots speed. Launching date, No. 4331, April 27, 1940; **No. 4330 delivered January 26, 1940.**

Hulls Nos. 4337, Delbrasil; No. 4338, Delorleans; and No. 4339, Deltargentino; three passenger and cargo ships for Mississippi Shipping Co. **Launching dates,** No. 4338, February 17, 1940; **No. 4339, July 13, 1940. Delivery dates, No. 4337, May 31, 1940;** No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hulls Nos. 4341-4343, three cargo vessels for Seas Shipping Co.

Hulls Nos. 4344-4348, five C-1 cargo vessels.

Hull No. 4349, Esso Nashville, tanker for Standard Oil Co. of N. J. 13,000 tons dwt.; 13 knots. **Launching date June 15, 1940.**

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417' 9", breadth 60' 0", depth 37' 5". Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. **Launching date, June 13, 1940;** contract delivery, September 1, 1941; estimated delivery date, October 15, 1941.

Battleship No. 61, order placed June 2, 1939; to be built under authority of Naval Appropriation Act for year 1940. Estimated delivery date August 1, 1943.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

Two steel tugs 90' x 23' x 10'; Fairbanks Morse 805 H.P. engines; for builder's account. Delivery dates August and September, 1940.

One wooden deck scow 118' x 36' x 10' for A. J. Harper, Baltimore, Md. **Delivery date July 31, 1940.**

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170'. **Delivery date, June, 1940.**

Hull No. 167, sub-chaser PC-452, length 174', for U. S. Navy. Keel laid March 14, 1940.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hulls Nos. 1627-1628, two welded steel coal barges, 134' x 34' x 17', for stock; 1534 gross tons.

Hull No. 1651, one 1300-H.P. steel hull diesel towboat for Union Barge Line Corp., Pittsburgh, Pa.; 550 gross tons.

Hull No. 1652, one 25-ton floating crane for U. S. Navy, Mare Island, Calif.; 335 gross tons.

Hull No. 1656, one welded steel carfloat 330' x 40' x 11' for Long Island RR, Philadelphia, Pa.; 1303 gross tons.

Hull No. 1659, one welded steel oil barge 148' x 38' x 9' for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135' x 26' x 8' for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135' x 27' x 11' 9" for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80' x 30' x 9' for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250' x 34' x 9' 1" for Pennsylvania R.R.; 5940 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 943 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135' x 27' x 11' 9" for Semet Solvay Company; 290 gross tons.

Hull No. 1717, one welded steel derrick

boat hull 100' x 36' x 7' for Anthony O'Boyle, Inc., N. Y. C.; 220 gross tons.

Hulls Nos. 1721-1724, four welded steel gasoline barges 195' x 35' x 9' 6" for Campbell Transportation Co., Pittsburgh, Pa.; 2272 gross tons.

Hulls Nos. 1726-1735, ten type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

Hull No. 1736, one welded steel oil fuel storage barge for Brooklyn Edison Co.; 375 gross tons.

Hulls Nos. 1737-1739, three welded steel oil barges, 195' x 35' x 9' 9", for stock; 598 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 35, Tambor (SS198); standard displacement 1475 tons; launched December 20, 1939; **delivered June 3, 1940.**

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; launched January 27, 1940; **delivery date, July 3, 1940.**

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; launched March 27, 1940; delivery date, September, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laid December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons; keel laid February 14, 1940.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons; keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 6, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Launched March 9, 1940.

Hulls Nos. 164, Doctor Lykes; 165, Almeria Lykes; 166 and 167; four C-3 cargo vessels for U. S. Maritime Commission. No. 166 keel laid March 4, 1940. Launching date, No. 165, April 27, 1940. **No. 164 delivered May 10, 1940.**

Hulls Nos. 168-169, CL51, Atlanta, and CL52, Juneau, two 6000 ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison, and 171, Ericsson, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission. Keels laid, No. 172, January 22, 1940; No. 173, May 6, 1940; Nos. 174-175, June 6, 1940.

Hulls Nos. 177 and 178, two tankers for the Standard Oil Co. of N. J. Launched May 25, 1940.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo ships for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co.; 13,000 dwt. tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co.; 15,000 dwt.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. Delivery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147' x 35' x 7' 6". Estimated completion date, August 1, 1940.

One oil barge, 195' x 35' x 9' 9", for C. J. King, Dothan, Ala. **Completion date, June 24, 1940.**

One oil barge, 225' x 35' x 10' 0", for Standard Oil Co. of Kentucky. **Completion date, July 22, 1940.**

Six sand and gravel barges, 110' x 26' x 6' 6", for Tennessee Valley Sand and Gravel Co. **Completion date, June 26, 1940.**

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

NEW CONSTRUCTION:

Four all-welded unmanned barges 173' x 39' x 8' 6" for Pan American Refining Co. **Delivery date June, 1940.**

One steel single-screw diesel tugboat 70' x 19' x 8' for Pan American Refining Co.; 450 B.H.P. **Delivery date June, 1940.**

Two all-welded unmanned barges 173' x 39' x 8' 6", for Higman Towing Co., Orange, Texas. **Delivery date, June, 1940.**

One all-welded steel tugboat 48' x 12' 3" x 6' 2" for Atlantic, Gulf & Pacific Company, N. Y.; 165 H.P. **Delivery date June, 1940.**

One all-welded steel tugboat 57' 7" x 14' x 7' 6" for Atlantic, Gulf & Pacific Co., N. Y.; 240 H.P. **Delivery date June, 1940.**

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406' x 57' x 23.5'. Approximate dates, launching date, September 15, 1940; delivery date, January 4, 1941.

One steel twin screw diesel towboat, 140' x 35' x 8' 6". Delivery date, November, 1940.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:
China Arrow.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, America, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Launched August 31, 1939; **delivery date, July 2, 1940.**

Hulls Nos. 371 and 372, two oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keel laid, No. 372, February 5, 1940. Launching date, No. 371, January 26, 1940.

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid, No. 380, November 13, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940. **Launching date, No. 379, June 7, 1940.**

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. Length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 7,700. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. Length 435', breadth 63', depth 40' 6"; gross tonnage about 8,000. Delivery date August 1, 1941.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

AV4, Curtiss, seaplane tender for U. S. Navy; launched April 20, 1940.

AD15, Prairie, destroyer tender for U. S. Navy. Launched December 9, 1939.

AV5, Albemarle, seaplane tender for U. S. Navy; keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland, and CL56, Columbia, two cruisers for U. S. Navy; order placed March 23, 1940.

U. S. NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Triton, Trout, Marlin, Grayling, Grenadier.

DRYDOCK AND ROUTINE REPAIRS:
Sailfish.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp.; 1600 gross tons; 300' x 65' x 20'; steam Una-Flow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. Launching date August 1, 1940; delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413' x 60' x 37' 6"; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Launching date November 1,

1940; delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95' 6" x 24' x 14' 9"; steam Una-Flow propulsion; 600 H.P.; 13-knots speed; cost $200,000 each. Launching date May 21, 1940; **delivery date June, 1940.**

Hull No. 1079, tug for Long Island R.R. Co.; 105' x 24' x 12' 11"; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. Launching date October 15, 1940; delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Launching date December, 1940; delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 190, one 16-knot tanker for Texas Co.; single screw steam turbine; 13,285 tons dwt. **Delivery date, June, 1940.**

Hull No. 192, single screw steam turbine railroad car carrier for Seatrain Lines, Inc. **Delivery date July 3, 1940.**

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date March, 1941.

Hull No. 194, one tanker for Atlantic Refining Co.; 19,400 tons. **Delivery date July 10, 1940.**

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 18,000 dwt. Delivery dates March and June, 1941.

Hull No. 196, one tanker for Sun Oil Co.; 18,000 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

Hull No. 207, tanker for Standard Oil Co. of New Jersey; 18,000 dwt. Delivery date August, 1941.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. **Delivery dates, No. 33, July 1, 1940;** No. 34, September 15, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

America's Largest Centrifugal Refrigerating Compressor

The contract for the largest centrifugal refrigerating machine in the United States has been awarded to the York Ice Machinery Corporation by the Industrial Rayon Corporation.

With a refrigerating capacity equal to the melting of 2,000,000 pounds of ice every 24 hours (1000 tons of refrigeration), the machine—a York-Allis Chalmers turbo-compressor—in combination with a York brine-cooling system, is also the largest single-unit refrigerating system using the refrigerant Freon-11 (Trichloromonofluoromethane) in the entire world.

This system will be used for industrial process air conditioning in an addition to the present $11,500,000 plant of the Industrial Rayon Corporation at Painesville, Ohio.

A unique feature of this refrigeration unit is its steam-turbine drive, which will be completely automatic in operation. Exhaust steam from the generating turbines will be used as a source of power, thus allowing the generated electric power to be used elsewhere in the plant, and reducing operating expense. This type of equipment was selected because of its reduced space requirements and efficient operation.

Four thousand gallons per minute of Lake Erie water will be used in condensing the refrigerant gases of the York cooling system. This system will cool 2,600 gallons of brine per minute to 40° for the new air conditioning equipment, and will be interconnected with the present brine cooling system to allow flexibility in using steam or electric power to drive the refrigeration systems.

Air conditioning is indispensable in maintaining proper temperatures and humidities in the various stages of rayon manufacture, and is especially important in the Industrial Rayon Corporation plant, in which every department is air conditioned. There, instead of being wound on a bobbin after the chemical spinning process, and handled repeatedly, as in most rayon manufacturing plants, the yarn is bleached, treated, dried and twisted before it is ever wound into a package. As a single thread, it moves continuously forward through processing liquids and cleaning baths and over drying reels—at all times protected by proper temperature and moisture content in the surrounding air. A product highly uniform in qualities and physical characteristics is the result.

Hercules Equipment & Rubber Co.

A unique service to shipbuilders and operators is that of the manufacturing divisions of Hercules Equipment & Rubber Company, San Francisco. In 1937 they purchased the assets and good will of the Gasket Shop and the Standard Rubber Company, both firms being old-timers in their respective fields of manufacturing.

In the rubber goods division are hundreds of molds, many of which are used in the marine trade. Stocks are maintained of pure gum rubber, float stocks, diaphragm and C. I. sheet, tubing, cord, etc. Special compounds are molded into any desired forms by experienced vulcanizer press operators.

In the gasket division are several thousand dies, and complete equipment for cutting, spinning, stripping or forming all types of materials. In the metal-working department are unique horizontal forming machines, on which metal-encased asbestos gaskets can be produced up to seven feet in diameter. The operators are experienced metal spinners, and work with all types of metals and alloys.

A battery of Seybold presses furnishes the power for die-cutting all soft materials, such as vegetable fiber sheets, compressed asbestos, rubber and paper, and stocks are maintained of corrugated copper-asbestos gaskets, spiral-wound metal and asbestos gaskets; also, ring and full-face gaskets for pipe flanges.

That this completeness of service is appreciated by the marine trade is evidenced by the growth of these manufacturing divisions, and they are backed up by a crew of experienced mechanical rubber goods salesmen who understand packing problems.

PACIFIC MARINE REVIEW

Advertisers

PACIFIC MARINE REVIEW

AUGUST, 1940

ADAPTABLE!

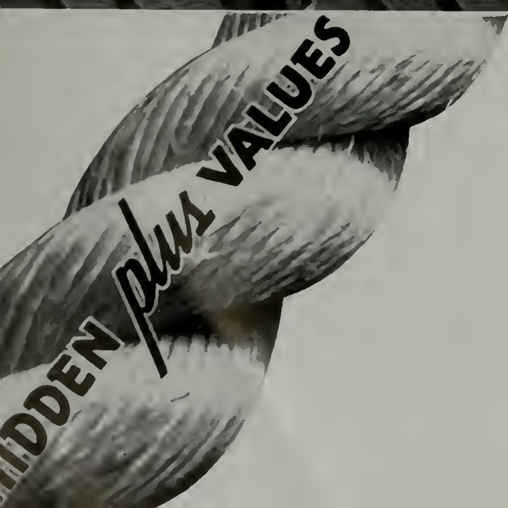
Another *hidden plus value* in Tubbs and Portland Marine Rope

Perhaps you've sometimes marveled at the adaptability of the trap drummer in a popular band to produce just the right accompaniment to the music.

It's a far cry from a trap drummer to a coil of rope. Yet, to serve efficiently rope must have this same adaptability to perform every task well.

This ability to conform to every requirement of the sea is another of the many *hidden plus values* built into every coil of Tubbs and Portland Marine rope. An asset that you cannot see, it is nevertheless one that will pay many extra dividends aboard ship.

Measured in terms of the many *plus values* Tubbs and Portland Marine Rope offer, it is the most economical rope you can possibly buy.



TUBBS CORDAGE CO.

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PORTLAND CORDAGE CO.

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EXTRA SUPERIOR MANILA
SAN FRANCISCO

PORTLAND CORDAGE
CLOVER LEAF MANILA
COMPANY

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

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No. 8

PACIFIC MARINE REVIEW

AUGUST
1940

National Defense Shipbuilding Program

The U. S. Navy has started its doubling process with a huge volume of orders.

Since January 1 the Navy has placed orders for 94 vessels with a total displacement of over one-half million tons and at an estimated cost of over one billion dollars. Of these orders approximately 90 per cent were placed during June and July. On January 1, 1940, the shipyards of the United States were building for the U. S. Navy 88 vessels, aggregating 502,165 tons total displacement and approximating $750,000,000 in cost.

This increase of 100 per cent in Naval tonnage under construction is just the beginning of the national defense program.

This Naval work is distributed among eight Navy yards and eight private yards, and all these yards, Naval and private, have plans under way for large expansion.

Merchant shipbuilding in ships 2000 tons and over shows, as of July 1, 175 vessels, with an aggregate gross measurement of 1,474,000 tons, an increase of approximately 25 per cent over figures for January 1, 1940. Like the Naval work, this also is only a beginning.

The Pacific Coast has already benefited to the extent of approximately $70,000,000 worth of shipbuilding orders, allocated as follows:

Union Yard, Bethlehem, San Francisco: 2 destroyers.

Navy Yard, Bremerton, Wash.: 4 seaplane tenders.

Mare Island Navy Yard, Calif.: 4 subs.

General Engineering & D. D. Co., San Francisco: 4 A.S.N. tenders.

Commercial Iron Works, Portland, Ore.: 4 A.S.N. tenders.

Lake Washington Shipyard, Houghton, Wash.: 4 A.S.N. tenders.

Enterprise Engine Co., San Francisco: 24 diesel engines.

REAR ADMIRAL EMORY S. LAND
U. S. Coordinator of Merchant and Naval Shipbuilding

Coordinator of Shipbuilding

The urgency of the national defense program, involving a tremendous increase in Naval and merchant shipbuilding, will crowd to capacity both Navy and private yards and the facilities of machinery and equipment manufacturers. In such circumstances, a maximum of cooperation and coordination is essential. For coordination, unit control is necessary, and President Roosevelt has named Rear Admiral Emory S. Land, Chairman of the U. S. Maritime Commission, as Coordinator of Merchant and Naval Shipbuilding.

No finer selection could have been made. Admiral Land, before his retirement from the Navy,

was Chief Constructor, and had charge of all coordinating building in Navy yards. For the past three years he has coordinated the great merchant shipbuilding program of the Maritime Commission. He is by nature, training and experience a master coordinator.

As at present constituted, the office of coordinator is advisory and carries no authority. As chairman of the Maritime Commission, Admiral Land has a very authoritative voice in merchant shipbuilding. As Coordinator of Shipbuilding, he should have equal authority in arranging the production schedules for Naval shipbuilding. Under ideal conditions the coordinating job is a tremendous task. With any divided authority involved, it becomes practically impossible.

Commission Assumes State Nautical Schools

On July 1 the United States Maritime Commission took over from the U. S. Navy the responsibility for cooperating in the maintenance and supervision of the state nautical schools, of which four are now in operation.

The transfer of authority from the Navy was effected by Government Reorganization Plan IV. It includes the responsibility for furnishing Government vessels and equipment for schoolships and for matching state contributions up to $25,000 for each school.

The Navy will continue to lend ordnance and other equipment used in naval science courses which prepare graduates for enrollment in the merchant marine naval reserve. As in the past, retired Naval officers will be appointed as superintendents of the schools.

At present, 507 young men are being trained in these schools to become merchant marine officers. The New York and California institutions admit out-of-state residents at a higher fee than state residents. The Pennsylvania and Massachusetts schools have restricted enrollment to residents.

The Maritime Commission favors provision by which eligible young men from any state may be admitted to the schools. The Commission plans to integrate the four schools with its own program of training cadets on merchant marine vessels to become officers. Already, all graduates of state nautical schools are eligible to become cadet officers under the Commission program, thus obtaining employment and experience even though there are no licensed officer vacancies immediately available.

The program will be developed through cooperation with the governing bodies and superintendents of the schools. They are:

Board of Commissioners, Massachusets Nautical School. Captain C. A. Abele, U. S. N., Retired, Superintendent.

Board of Visitors, New York Merchant Marine Academy. Captain J. H. Tomb, U. S. N., Retired, Superintendent.

Board of Commissioners, Pennsylvania Nautical School. Captain G. M. Baum, U. S. N., Retired, Superintendent.

Board of Governors, California Maritime Academy. Captain Claude B. Mayo, U. S. N., Retired, Superintendent.

The New York Merchant Marine Academy is the oldest of these schools, having been founded in 1875, and has an enrollment of 172. Massachusetts came next, in 1893, and now has 120 enrolled. Pennsylvania, founded in 1919, has 95 students. California, the youngest (1929), has 120 enrollees.

The Maritime Commission is fast becoming one of the most important educational institutions in the United States. Through its Maritime Service, six shore stations are maintained for the training and education of licensed and unlicensed personnel under the tutelage of the U. S. Coast Guard. These stations are located at: Hoffman Island, New York, where there is capacity for 600 unlicensed enrollees; New London, Conn., with facilities to take care of 100 licensed enrollees; at Governor's Island, Oakland, Calif., which will accommodate 100 licensed officers; at St. Petersburg, Fla., equipped to train 250 apprentice seamen; at Gallop's Island, Boston, Mass., which is also outfitted to take care of 250 apprentice seamen; and at Hueneme, Oxnard, Calif., which will be ready January 1, 1941, with a staff of 50 to handle 250 apprentice seamen.

It is estimated that approximately 4000 officers and unlicensed personnel will have taken training courses in the three shore stations devoted to that purpose before January 1, 1941, and that during 1941 the three apprentice training stations will be filled.

The Commission cadet training system on American merchant ships and on Army and Navy transports is growing rapidly, and at the present time nearly 500 young men are in this system.

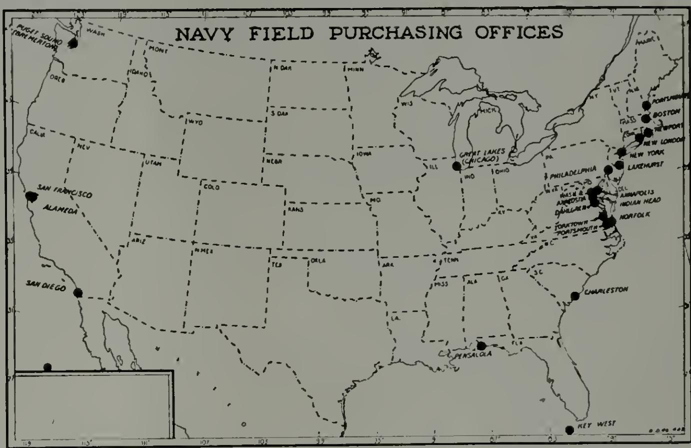
By the summer of 1941 Maritime Service and Coast Guard will have 3000 under training at any given time, and an enrollment representing a very large cross-section of American merchant marine personnel.

The safest and finest ships in the world will be manned by the most highly-trained crews and best educated officers.

Procurement in the

National Defense Program

Do Not Apply to Washington for Information About Purchases; Apply to Your District Purchasing Office



During 1938 the procurement activities incident to naval construction were decentralized, and some 27 major field purchasing officers established in 23 cities. This reorganization has now become highly significant in view of the tremendous sums being appropriated by Congress for Naval and Army expansion.

The Bureau of Foreign and Domestic Commerce calls the attention of American business to this newly-enlarged market in a release for July 13, wherein are printed the principal purchasing agencies of the Army and the Navy, together with maps showing the territory covered by those agencies.

Our readers will be principally interested in the Navy Department, the Army Engineers Corps (non-military branch in charge of rivers and harbors), and the Army Quartermasters Corps, which operates the Army transports.

The United States Navy purchases a very wide variety of materials, equipment, supplies and machinery for military and non-military uses through its various supply offices. These are located as shown on the map reproduced herewith, and include:

Alameda, Calif.—Supply Officer, Naval Air Station.

Anacostia, D. C.—Supply Officer, Naval Air Station.

Annapolis, Md.—Supply Officer, Naval Academy.

Boston, Mass. — Supply Officer, Navy Yard.

Charleston, S. C.—Supply Officer, Navy Yard.

Dahlgren, Va. — Supply Officer, Naval Proving Ground.

Great Lakes, Ill., Supply Officer, Naval Training Station.

Indian Head, Md.—Supply Officer, Naval Powder Factory.

Key West, Fla.—Supply Officer, Naval Station.

Lakehurst, N. J.—Supply Officer, Naval Air Station.

New London, Conn.—Supply Officer, Submarine Base.

New York, N. Y. — Officer-in-Charge, Navy Purchasing Office, P. O. Box 9, Station C.

Newport, R. I.—Officer-in-Charge, Navy Purchasing Office.

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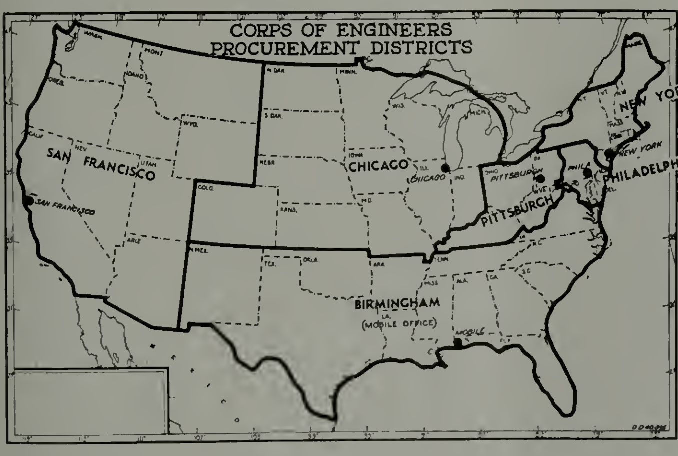


Ten large shop-assembled units, shown in place, formed complete outer part of hull and permitted rapid yard erection.

At Oakland —

Dravo Builds Navy's First

by Geo. F. Wolfe

Chairman Welding Committee, Engineering Works Division
Dravo Corporation, Pittsburgh, Pa.

The first all-welded floating crane to be purchased by the Bureau of Yards and Docks, Navy Department, was delivered to the Mare Island Navy Yard July 18, 1940, by the Dravo Corporation, Pittsburgh, Pa.

This full revolving crane, having a main hook capacity of 25 net tons at 55 ft. radius, is of all-welded construction and is mounted on an all-welded hull having a length of 100 feet, beam of 45 feet and a depth of 8 feet 6 inches. Both the revolving crane and the hull were fabricated by the Engineering Works Division of Dravo Corporation at their Neville Island Plant, near Pittsburgh, Pa., and shipped to the West Coast for final assembly.

The hull was divided into a number of separate watertight compartments by a system of longitudinal and transverse bulkheads. The longitudinal bulkheads were spaced 6′ 6″ inboard from each side, and permitted the complete shop assembly of box sections having a width of 7 feet, a depth of 8′ 6″ and lengths of 20 to 28 feet, using three sections for the entire side of the main body of the barge. The transverse bulkheads, located eleven feet from each end of the hull, likewise permitted large shop assemblies, as only two pieces were shipped comprising each rake end, these half rake sections having dimensions of about 8′ 9″ x 12′ 0″ x 23′ 0″ and weighing up to 16 tons each. This construction is shown in Fig. 1, which is a photograph taken just two weeks after the arrival of the fabricated sections at the site. The three box sections forming each of the sides, and the two sections making up each complete rake end, or a total of only ten large, fully assembled shop units, totaled almost 60 per cent of the steel in the entire hull. The balance of the hull steel, consisting of full depth non-watertight longitudinal and transverse bulkheads under the crane base, two longitudinal trusses and transversely framed deck and bottom sections, were likewise shop assembled.

Hull a few days before launching. Crane base in place with part of rotating platform erected. Fender work and application of bituminous enamel well under way.

All-Welded Floating Crane

This method of shop assembly has many advantages. The building up of these large sections in a properly-equipped plant provides for the positioning of the assembled units for downhand welding of the best quality under careful supervision. Thus, thousands of feet of welding, and particularly that in small enclosed compartments, which would normally be overhead and vertical welding, was done downhand under ideal conditions. The time and expense of erection in the yard was cut down to a minimum, and this 200-ton hull of all-welded construction was assembled, welded, sand-blasted, coated with bituminous enamel and launched in 55 calendar days after the arrival of the steel in San Francisco harbor.

The full revolving crane mounted on the hull is of the diesel electric

CRANE CHARACTERISTICS

Capacity of Crane
Main Hook—50,000 pounds at 55 ft. max. radius.
Aux. Hook—10,000 pounds at 70 ft. max. radius.

Hoisting Speeds
Main Hook—30 ft. per min. under 25-ton load.
Aux. Hook—100 ft. per min. under 5-ton load.

Rotating Speed
One revolution in 2 minutes with 25-ton load at 55 ft. radius.

Luffing Speed
With 25-ton load from 55 ft. to 35 ft. radius in one minute.

Hook Lifts
Each hook to move vertically to 25 ft. below water level at any radius and to 75 ft. above water level at maximum radius.

Rope Reeving
Main Hook—Six Parts of 7/8" Dia. Wire Rope.
Aux. Hook—Single 7/8" Dia. Wire Rope.
Boom Luffing—Twelve Parts of 7/8" Dia. Wire Rope.

Erection view of rotating superstructure. Note high location of boom pins at upper left corner just above raised operator's cab. Walkways and ladders provide access to all working parts.

First test load lifted was a 53,000-pound diesel engine, which was used for all preliminary tests.

type. A 180-hp, 6-cylinder, 4-cycle fresh water cooled diesel engine directly connected to a 230-volt direct current generator of 100 kw continuous rating provided electric current for the five individual motors which furnish power for various operations. The main hoist drum, auxiliary hoist drum and boom luffing drum are driven by independent motorized mechanisms. In addition, the swinging mechanism is motor driven, as is also a deck winch located just forward of the crane base. All motors are equipped with magnetic holding brakes, while a system of hydraulic foot brakes is provided for control of the various motions. A safety spud lock is provided to anchor the revolving structure when not in use, with a cutout switch to prevent rotation of crane while the spud is set.

This installation of five motors and the generator required a rather extensive set of control panels and a fairly complex wiring system with all wiring carried in metal conduits. A lighting system was provided for the crane, including two large adjustable floodlights mounted on the roof of the machinery house and

53,000-pound load swung directly over the side of the hull caused very little change in trim.

The diesel generator set, as shown in this machinery house interior view, was mounted at the extreme rear of the house on sound-insulated concrete foundation.

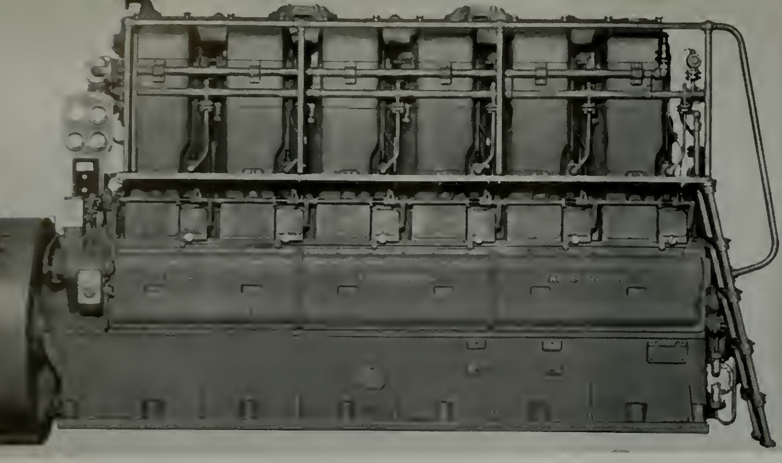
controlled from the operator's cab, as well as lights at each corner of the hull. To provide air for starting the diesel engine, an air compressor was furnished which is driven by a direct-connected electric starter equipped gasoline engine with a system of clutches to also provide for the driving of a 3-kw generator for the lighting system.

The requirement of a high lift of 75 feet above water for the hooks, coupled with a desire to clear the ship's rigging, dictated a rather unusual type of trussed superstructure, together with a goose-neck type of boom. The forward part of this framework was carried up to a point several feet above the roof of the elevated operator's cab for the boom foot connections, while the boom luffing sheaves were located even higher at the rear end of the trussed structure. This unusual extension of a trussed structure above the roof of the machinery house necessitated the penetration of the steel roof by the truss members, but the all-welded construction was particularly adapted to the easy closing of these openings.

The revolving superstructure was mounted on a live roller circle, consisting of 34 double flanged rolled steel wheels running between 20 ft. diameter rail circles, attached to the rotating platform and the fixed base. Bronze bushed stediment castings keep the crane centered, and a heavy king pin provides a safety factor against overturning if overloaded. Sufficient concrete counterweight is provided in the rear of the revolving platform to keep the center of gravity of the crane within the roller circle under all specified loading conditions with no king pin pulls. A heavy cast steel slewing rack is bolted to the fixed base, all of which was shop assembled and shipped in two large sections ready for erection on the hull.

In addition to the welding of the hull and crane structure, welding was used extensively on the machinery. All bases for the load and boom hoists were welded, as were all rope drums, gear cases and bearings, resulting in mechanisms of light weight but of positive strength and known material. All hoists were mounted on wood block cushions and the diesel-generator set was mounted on an independent concrete base, set in a recess in the main concrete counterweight and separated from it by a one-inch cushioning layer of insulating material to deaden the sound. The interior of the machinery house was lined with insulating board to assist in the reduction of noise at the operator's position.

This is the first all-welded floating crane to be placed in the United States Navy service, and should prove most satisfactory in operation. All materials for both the hull and superstructure were shipped from the contractor's plant at Neville Island, Pittsburgh, Pa., by rail to Baltimore, Md., and thence by water to San Francisco Bay. The assembly on the West Coast was performed by the Pacific Dry Dock and Repair Company at their Oakland, Calif., yard under the supervision of the author.



Atlas Diesel engine, 450 bhp at 350 rpm, for C-1 auxiliary generating sets; front side.

Auxiliary

At the present time there are a considerable number of large marine and stationary Diesel engines operating successfully on heavy fuels. These engine installations can undoubtedly show remarkable overall operating economies due to the fact that the cost of the heavy fuels is only about $\frac{1}{3}$ to $\frac{1}{2}$ the cost of conventional Diesel fuel. The heavy fuels referred to above must not be confused with ordinary Bunker fuels which as a rule have proven unsuitable for Diesel engine use. However, most oil refineries manufacture at least one better grade of heavy fuel which is only slightly higher in cost than the regular Bunker grades. This slight price difference, however, is more than repaid by reduced maintenance costs over long periods of time.

The heavy fuels referred to above have, of course, poor ignition qualities when compared to conventional Diesel fuels and since the carbon residue and the asphalt content are also high it is a foregone conclusion that these fuels could not be used in engines which are sensitive to fuels and require rigid fuel specifications for successful operation. There are a good many "high speed" engines, even of comparatively large size, which require not only ordinary Diesel fuel but "premium" Diesel fuels for proper operation and it would of course be inadvisable to attempt to burn heavy fuels in these engines. Undoubtedly there is also a limit to the minimum bore of an engine which can successfully burn heavy fuels without seriously affecting the upkeep.

There are, however, no valid reasons why slow or medium speed engines in the power range of 300 to 600 H.P., such as would be used as auxiliaries in cargo ships, should not be capable of burning heavy fuels. It is particularly fortunate that the building of the U. S. Merchant Marine is largely under the supervision of the Maritime Commission who have realized this fact and insist that the auxiliary engines must hold their own along with the main propulsion engines and burn the same heavy fuel as used by the main engines. A little space and weight might be saved by specifying high speed engines but at the expense of reliability and operating economy as this type of engine could not successfully burn heavy fuel over long periods of time without unduly raising the maintenance costs. It would, of course, also be a dictinct disadvantage to have to bunker two different kinds of fuels.

When the Atlas Imperial Diesel Engine Co. was awarded the contract for the ten auxiliary Diesel generating set engines to be used in the C1-B cargo vessels which are at the present time being built by the Western Pipe & Steel Co. for the account of the U. S. Maritime Commission, it was decided to modify the standard design of their stationary engine to better meet the particular operating conditions and to make possible operation on heavy fuel. The main modifications consist of a completely enclosed engine structure with pressure lubrication to all bearings including camshaft and rocker arm bearings as well as automatic lubrication of valve stems. The main structural design, however, follows standard Atlas practice with individual cylinders and cylinder heads. A platform at a convenient height for servicing the cylinder heads is also provided.

The camshaft is located on the operating side of the engine and is gear driven. A Woodward governor capable of the close regulation required in generator drive is located on the operating side at the control station close to the flywheel. The gage board is also located close to this point and mounts gages for fuel, lubricating oil, and starting air pressure. On the gage board is also located a tachometer and an exhaust pyrometer. Thus the engine can be completely controlled, and functioning observed from the control station close to the flywheel. An overspeed governor which will shut down the engine and trip the generator circuit breaker in case the speed exceeds the normal operating speed by 10% is also provided.

Bosch fuel injection system is used on this engine and means are provided to individually cut out the various pumps so that if necessary repairs to the injection system can be effected while the engine is running. In order to successfully burn heavy fuel it is necessary that it be heated and that the fuel temperature be closely controlled. This engine has consequently been provided with a fuel heater using low pressure steam, the steam supply being controlled by a Taylor Self-Acting Temperature Controller. The temperature can be adjusted to allow for fuels of different viscosities. The entire fuel supply system on the engine is automatically vented so that any gases formed during the heating process are immediately bled off. The gases formed are often highly corrosive and it is therefore desir-

Diesel Generating Units for Maritime Commission C1-B Cargo Vessels

able that they do not pass through the injector pumps and valves where they might also cause vapor locks and prevent proper injection.

Since the heavy fuels are not as clean as the conventional diesel fuels the question of fuel filtration has received considerable attention. Primary and secondary fuel filters of ample capacity are provided. These filters are of the cloth and metal element type. In addition to the filtering on the engine all fuel burned on board the ships will be centrifuged. As a further modification for burning heavy fuel, the exhaust valves are of a somewhat harder material than that used for the standard line of engines and are provided with hard exhaust valve seat inserts. The exhaust valve cage and the fuel injection valve cage are directly water cooled.

Fresh water cooling is used on the engine with a heat exchanger manufactured by the Ross Heater & Mfg. Co. provided. A lubricating oil cooler of Ross Heater & Mfg. Co. make is also provided and a lubricating oil filter of Purolator make.

The model 6HS2124 generating set engines have a bore and stroke of 13″ x 16″ and are normally rated 450 H.P. at 350 R.P.M. The engines are direct connected to 120/240 V. compound wound direct current generators with rated capacities of 250 K.W. These generators are of the marine type construction in conformance with the requirements of the American Institute of Electrical Engineers.

The first two generating set engines have now passed their block tests, the first engine having been subjected to an endurance run to prove its reliability for the service intended and to demonstrate its ability to burn heavy fuels. The endurance run consisted of two days under 125 H.P. load followed immediately without a shutdown by 8 days under 375 H.P. load, followed immediately by two hours under 450 H.P. load. The fuel consumption during the entire 8-day period at 375 H.P. load burning heavy fuel was .379 lbs. per H.P. hour and during the 2-hour 450 H.P. period the same fuel consumption was obtained. During the entire endurance run no shutdowns were allowed and no adjustments of any kind were made on the engine. Nevertheless the variation in exhaust temperatures on the various cylinders was very small and no more than is normal for operation with conventional Diesel fuel. The exhaust was clear throughout the run.

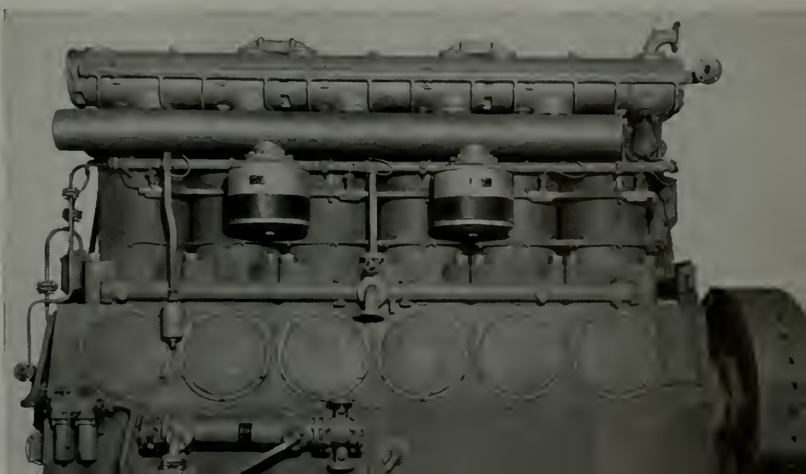
The heavy fuel used for the block and endurance tests had the following analysis:

High heat value—18,745 B.T.U.'s per lb.
Gravity A.P.I.—16.9.
Viscosity at 77° F.—137 Secs. Saybolt Furol.
Viscosity at 122° F.—305 Secs. Saybolt Univ.
Flash Point—Cleveland—205° F.
Conradson Carbon—8.42%.
Asphalt—Holde—2.9%.
Sulphur—1.62%.

The above fuel is obtainable in Oakland, Calif., for approximately $1 per barrel or roughly 2c per gallon as compared to a price of approximately 5c per gallon for conventional Diesel fuel. A direct saving of 3c per gallon is consequently effected and considering the fuel consumptions obtained fuel

(Page 52, please)

Atlas Diesel engine, 450 bhp at 350 rpm, for C-1 auxiliary generating sets; rear side.



Two New Streamlined Tugs by P & J Complete Successful

Trials recently completed on the two new tugs, H. S. Falk and J. P. Pulliam, designed and built by the Pusey & Jones Corporation of Wilmington, Delaware, for Donaldson Towing and Lighterage Company, afford ample proof of efficiency and sturdy, dependable power and construction.

The tugs are of the same dimensions as Carolyn and H. C. Jefferson, two similar tugs delivered by Pusey & Jones in 1936 to the same owners. The principal characteristics are:

Length overall	95′ 6″
Length, load water line	88′ 0″
Beam molded	24′ 0″
Depth molded	14′ 9″
Draft, maximum	12′ 0″
Steam pressure	175 psi
Superheat	100° F.
Engine power	550 shp
Fuel oil capacity	60 tons
Feed water capacity	33 tons
Potable water	500 gallons
Cruising radius	1600 miles

The hull form is on Yourkevitch lines, calculated for propulsion efficiency and for elimination of stern squat.

Propulsion Machinery

Steam is generated in a two-drum marine water tube boiler built by the Combustion Engineering Company. This boiler has oversize drums, large reserve capacity, a low center of gravity and a very compact design. Burning Bunker "C" fuel oil in Todd variable capacity burners, it will deliver normally 13,000 pounds of steam per hour at 175 psi pressure and 100° F. of superheat. The engine is a Skinner Unaflo of two cylinders with 25-inch bore and 20-inch stroke and having cranks set at 90°. On the above steam conditions it develops 550 bhp at 130 rpm when exhausting into the condenser at 26 inches vacuum.

This engine swings a cast steel four-bladed propeller eight feet in diameter and running in a Kort nozzle. Propeller and nozzle were especially designed for towing potentialities by the technical staff of the Dravo Corporation. The difference between these tugs and those built to the same model in 1936 lies in two items. The 1936 tug had Scotch marine boilers, and was not equipped with Kurt nozzles.

Trial results demonstrate that as compared with the 1936 tug, the 1940 tug shows:

(1) A bollard towline pull of 31,600 pounds against 21,700 pounds, and an astern pull over 10,000 pounds greater.

(2) A saving of 62 pounds of fuel per nautical mile when towing at 6 knots.

(3) An increase of fuel bunker capacity by 15 tons.

(4) An increase in cruising radius towing at 6 knots of nearly 1000 nautical miles.

(5) A substantial increase in galley space.

In other words, the H. S. Falk and the J. P. Pulliam are able to handle with ease much heavier tows than could be taken by the Carolyn or the H. C. Jefferson, and to do so

Steam tug H. S. Falk.

Pilot house features wide range of clear vision.

Trials

with less fuel consumption than the 1936 tugs would use for their much lighter capacity tows.

Another striking innovation in design is the broad vision pilot house. Its forward windows, as will be noted in the illustration, slide in metal tracks on a thin steel post, so that there is practically a 100 per cent unobstructed view on a 180° segment forward. The trunk deck over the engine room is low enough aft of pilot house to allow an unobstructed view of the after deck from the after windows of pilot house.

The service pumps in the engine room are all Warren steam drive. Davis Engineering Company supplied the feed water heater. An American Engineering Company hydro-electric gear takes care of steering.

Crew Accommodations

A spacious, well-insulated forecastle accommodates six men with ample locker space and comfortable berths. Immediately aft of this space are two mahogany trim rooms, each of which accommodates two officers. The captain's room is just aft of the pilot house.

A crew's lavatory and an officers' lavatory, each equipped with toilets, showers and wash basins, are installed in the forward end of the house on the main deck. Just aft of this space in the main deck house is a large galley and a mess-room. equipped with: a Webb perfection oil-burning galley range fitted with a Ray oil burner; a Copeland electric refrigerator, and stainless steel trimmed cupboards, sink, dressers and mess table.

Crew's quarters.

Galley of tug H. S. Falk.

Lake Washington floating bridge from the Seattle side.

World's Largest Floating Structure

Newly-Completed Lake Washington Pontoon Bridge - - - A Unique Engineering Feat

by

Chas. F. A. Mann

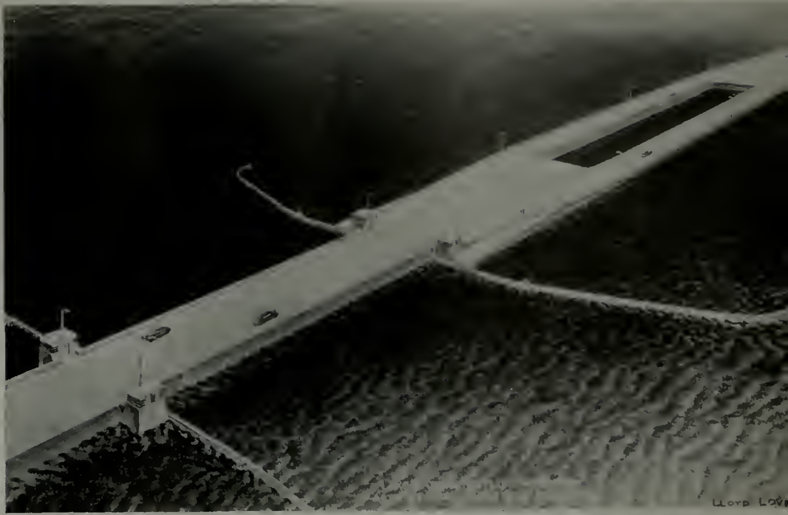
One of the most remarkable pieces of engineering, particularly engineering of a kind that floats, is the new Lake Washington Floating Bridge, completed and opened to traffic from Seattle to Mercer Island on July 2.

This floating bridge, with a 6561-ft. floating section stretching across the middle of the great deep lake that extends for 20 miles across Seattle's eastern city boundaries, has a total displacement tonnage in excess of 100,000, as compared with the Queen Mary's loaded displacement of approximately 70,000 tons.

Long a barrier between Seattle's business district and the summit of Snoqualmie Pass—the main east-west highway route across the State—Lake Washington has not been bridged before, largely due to the fact that the lake averages over 200 feet deep, and has a layer of soft mud over 100 feet deep below that. A conventional type suspension bridge would have cost from 20 to 50 million dollars, and toll charges could never hope to pay for it.

No imaginative flight determined the type of crossing for Lake Washington; it was simply a matter of necessity. Tolls must be reasonable and the project must save time and distance if it is to compete with free routes around the north and south

Artist's drawing, showing floating draw section. First of its kind ever built.



ends of the lake. This floating bridge includes: a twin-bore 4-lane approach tunnel system under Mt. Baker Ridge, Seattle, a length of 1400 feet; two side fixed and two side transition spans (ferry ramp type), the central floating section. Mercer Island Highway, east Mercer Channel fixed span, Mercer Slough bridge viaduct, and the new highway between Factoria at the extreme eastern shore and Issaquah, at the mouth of Snoqualmie Pass. Its total cost is $12,000,000, approximately $9,000,000 of which was for the floating bridge itself, a joint PWA and RFC project, with about $5,000,000 of the cost to be repaid by tolls.

With no tidal action in Lake Washington, plenty of mud to anchor the pontoons into, and a navigation problem simplified by the comparative smallness of the vessels using the north-south route on the lake, the problem was to create a structure that was durable, vibrationless, and designed to make use of all the properties of reinforced concrete, yet keep within cost and weight limits.

The result was a remarkable grouping of ideas and a perfect solution to the problem. Heretofore other pontoon structures have been simply boat-shaped sections bridged together with ordinary spans. The Lake Washington structure is simply a 4-lane concrete highway formed out of the top slab of a concrete monolithic box floating on the surface of the lake.

The engineering staff of the Lake Washington Bridge, a division of the Washington Tollbridge Authority, is headed by Chas. E. Andrew as consulting chief engineer, and Lacey V. Murrow, chief engineer of the State highway system. Proceeding along an original line of research into the problems to be solved, it was determined to have a floating section 6561 feet long, with a 200-foot draw-span type of pontoon that would be hauled back inside the well formed by two side-arm pontoons, to permit passage of larger vessels. The draw, or movable pontoon, weighing nearly 10,000,000 lbs., is moved in 90 seconds from open to shut by two 75-hp motors operating through haul-back and pulling cables. A track on the inner ledge of the two side pontoons matches four cast steel rollers, two horizontal and two vertical, and a pair of conical centering devices assure complete and tight fit of the draw and fixed sections after each opening. It is the world's first floating draw span.

Lake Washington Bridge is brilliantly illuminated.

The main floating portion is made of 10 "typical" concrete pontoons and 12 of special design. Leading down to this section at each end are two ferry-slip transition spans swung on the inner end of the two 215-ft. fixed side spans.

Each of the typical pontoons is 349 ft. 10 in. long, 59 ft. wide and 14 ft. 6 in. deep. Each pontoon is made of dense reinforced concrete, almost plastic when placed and carefully vibrated and formed in an oiled wooden lining. About 350 tons of closely-spaced reinforcing steel bars are used in each section on all walls, bottom, top and guard railing. Each pontoon weighs 4558 tons, and has a normal draft of about 7 ft. 2 in.

The pontoons were built in a pair of specially-constructed graving docks on Harbor Island, Seattle. With a heavy foundation, and bottom floor level sufficiently below tide level to float out the concrete pontoons, the building docks were miniature graving docks. The bottom and sidewalls were poured almost in one continuous pour, and after 4½ days of setting, floodgates were opened and the pontoon floated free.

The pontoons are built to a thickness of 8 inches on the roadway area, outer walls and bottom slab. The interior is divided into 96 cells of about 14 x 14 x 14 ft. each, which are in turn interconnected into groups of eight to form 12 watertight compartments, any two or three of which can be flooded without harming the bridge. Diaphragm walls inside are 6 in. thick. Around the ends of each pontoon, sixty-four 3-inch bolt holes were formed to permit insertion of bolts to tie two end walls together. A soft rubber sealing gasket was placed around the perimeter of each pair of ends, in a specially-constructed slot near the outer skin. By means of hydraulic jacks these huge nuts and bolts were tightened, and the remaining 1-inch space was filled with thin cement grout. Two square shear blocks match two square holes in each mounting end pair to provide additional shear strength between floating sections.

Because of the rigidity of the connections, it is estimated that a whole floating section could be damaged by collision, yet the structure would remain perfectly safe.

One of the pontoon floats being towed through Lake Union Ship Canal.

The designed capacity is for a load of 20-ton trucks placed bumper to bumper in a 90-mile wind. With such a load, the floating section would have a draft of approximately 9 feet and a freeboard of 5 feet 6 inches. The displacement of each pontoon per inch of immersion is 53 tons. In other words, the weight of 35 average automobiles on any one pontoon would cause that pontoon to drop 1 inch.

The anchorage system consists of transverse and longitudinal anchors. On each side of each pontoon, a 2¾-inch cable runs from a huge fan-shaped concrete anchor 26 x 14 feet in size, sunk into the mud bottom of the lake by water jets, up to the center of the side of the pontoon, just below the waterline.

To compensate for the seasonal variation of Lake Washington's level, controled by the Lake Washington Ship Canal, these cable ends are racked back and forth by means of portable hydraulic jacks, to let out or take up slack. A movement of 12 feet is provided for, and normally considerable tension is maintained on the cables which causes them to tie the pontoons tightly against the lake's surface. Red lighted buoys warn small craft at each point where the cables descend on a gentle angle to the anchors. At the draw span, fore and aft anchors are provided also, similarly designed.

All the special sections, where extra weight must be carried, are provided with steel buoyancy units placed under the bottom of each pontoon that requires them. Dual piping permits blowing any seepage out of them with compressed air.

The arched spans at either end and on East Mercer Channel have 39-ft. clearance (vertical) and 215-ft. horizontal clearance, which cares for 97 per cent of Lake Washington north and south traffic.

Another unique feature is the elaborate Selsyn control system on the buoyancy cells in the end pontoons, where the fixed and the floating portions join at the transition spans. Various groups of cells are connected to the main control circuit, where water inlet and pumping outlet valves, Selsyn operated, keep the angle of descent constant and the level of the pontoon section perfect at all times, by a simple hookup from a master Selsyn unit mounted ashore, which functions automatically as the lake level varies throughout the year or as the load on the bridge varies. Fifteen miles of conduit were used to hook this ballasting system up with the two master units located at each end.

Tolls on the bridge are 25 cents per car and driver, and an 8-lane toll gate is fitted out at the Mercer Island end.

The entire project was rushed so speedily that it was cut up into eleven units, each under separate contract.

Instead of the tortuous route around the southern end of the lake, at Renton, and over the hilly country to Issaquah, traffic now speeds from Rainier Ave., in the heart of Seattle, each through the huge twin-bore tunnels, down to the bridge and to Mercer Island in 7 minutes flat.

The entire project will eliminate 65 per cent of the curvature, 14 miles of distance, and 50 per cent of the rise and fall between Seattle and the summit of Snoqualmie Pass. Tolls are now averaging $2000 per day, gross. The Northwest likes this floating concrete monster.

Procurement for National Defense

(Continued from Page 23)

Norfolk, Va. — Supply Officer, Naval Air Station. Officer-in-Charge, Naval Supply Depot, Naval Operating Base.

Pensacola, Fla.—Supply Officer, Naval Air Station.

Philadelphia, Pa.—Supply Officer, Navy Yard. Supply Officer, Naval Aircraft Factory, Navy Yard.

Portsmouth, N. H.—Supply Officer, Navy Yard.

Portsmouth, Va.—Supply Officer, Norfolk Navy Yard.

Puget Sound, Wash.—Supply Officer, Navy Yard.

San Francisco, Calif.—Officer-in-Charge, Navy Purchasing Office.

San Diego, Calif.—Supply Officer, Naval Air Station, North Island. Officer - in - Charge, Naval Supply Depot, Naval Operating Base.

Washington, D. C.—Supply Officer, Navy Yard. Supply Officer, Naval Research Laboratory.

Yorktown, Va.—Supply Officer, Naval Mine Depot.

From this list it would appear that there are three principal Navy purchasing offices in the country—New York, Newport, R. I., and San Francisco, Calif.

The purchases handled by these offices include all equipment, outfitting, maintenance and supply items for warships and for transports; all purchasing incident to new construction in Navy yards. In short, Navy purchasing offices are in the market at one time or another for practically any article or material known to American commerce. For instance, Pacific Coast Navy purchasing offices have recently purchased two former transpacific liners, and ordered them reconditioned for transport service by the Seattle Drydock Company at a cost of well over a million each.

Army Quartermasters Corps

The Quartermasters Corps purchase a large amount of marine supplies, machinery, equipment and materials in connection with the building, operation, maintenance, reconditioning and outfitting of ships in the transport service. Their districts and officers are as follows:

Atlanta, Ga.—Army Quartermaster Procurement Planning District, 1306 Twenty-two Marietta Building.

Boston, Mass. — Army Quartermaster Procurement Planning District, Quartermaster Depot, Army Base.

Brooklyn, N. Y.—Army Quartermaster Procurement Planning District, First Avenue and 58th Street.

Chicago, Ill.—Army Quartermaster Procurement Planning District, 1819 West Pershing Road.

Detroit, Mich. — Army Quartermaster Procurement Planning Office, 611 Federal Building.

Jeffersonville, Ind.—Army Quartermaster Procurement Planning District, 10th Street and Meigs Avenue.

Philadelphia, Pa.—Army Quartermaster Procurement Planning District, 21st and Johnson Streets.

St. Louis, Mo.—Army Quartermaster Procurement Planning District, Second and Arsenal Streets.

Fort Sam Houston, Texas—Army Quartermaster Procurement Planning District, Quartermaster Depot.

San Francisco, Calif. — Army Quartermaster Procurement Planning District, Fort Mason.

Corps of Engineers

The non-military branch of the Corps of Engineers, U. S. Army, is in charge of all river and harbor improvement and maintenance. In carrying on this work, they use many types of marine craft, such as dredges, snagboats, derrick barges and tugs. The wear and tear on such craft makes a large maintenance job, and is productive of much purchasing. This department also is in the market for many standard and many special types of marine equipment, machinery, materials and supplies.

This agency has six procurement district, as follows:

Chicago, Ill. — Army Engineer Procurement District, 1117 Post Office Building.

Mobile, Ala. — Army Engineer Procurement District, 212 Wilson Building.

New York, N. Y. Army Engineer Procurement District, 39 Whitehall Street.

Philadelphia, Pa.— Army Engineer Procurement District, Second and Chestnut Streets.

Pittsburgh, Pa.—Army Engineer Procurement District, 1012 New Federal Building.

San Francisco, Calif.—Army Engineer Procurement District, 409 Customs House.

Any manufacturer or vendor who desires information on the national defense program in connection with the above divisions should not address his inquiry to Washington, but should write to the office of the district in which he is located. By so doing, he will save valuable time and will get more personal attention for his inquiry.

100 Years of *Marine Engineering*

History of Cunard Line Parallels Development of Seagoing Steam Navigation

Just a hundred years ago, a little steamship, a mere 207 feet long and displacing only 2,000 tons, began to vibrate as her big side wheels turned up the water of the River Mersey, Liverpool, England, in a miniature cascade. There were decorous cries of goodby, much waving of handkerchiefs and gloves by immaculate and slightly tearful ladies and equally immaculate but animated gentlemen.

The ship was the staunch R.M.S. Britannia, and aboard her was a taciturn man known simply as Samuel Cunard, Esq., of Halifax, in Nova Scotia. His face was distinctly serious, for in this venture of establishing a regular service by steamship between England and America he had put the greater part of his not inconsiderable fortune.

Men Were Skeptical

There had been several voyages across the Atlantic by steamship, the Savannah, the Royal William and, more recently, the Sirius, but they had been purely experimental and no regular service had developed. In the meantime the United States was developing its fast new sailing clippers, which people were beginning to say were the finest ships on the seven seas —for beauty, at any rate, even if they did sacrifice valuable cargo space for speed.

Not a few of the gentlemen who saw the Britannia depart from Liverpool that July 4th one hundred years ago openly expressed their doubts that the new project could succeed. The steamship was still a relatively untried means of navigation. It was doubted that one could carry sufficient coal to fuel her "mighty" engines of somewhat over 700 horsepower for a complete trip. In any case, didn't her owners themselves seem doubtful, since she was built fully-rigged as a sailing ship, and it was known that they intended to save their coal supply by taking advantage of favorable winds whenever possible?

But They Made Profits

Time vindicated Samuel Cunard's tenacious daring. Not only did the Britannia continue in transatlantic service profitably, but shortly she was joined by her three sisters, the Acadia, Caledonia and Columbia. Steadily they plied between Liverpool and Halifax, then down to Boston.

In 1843 the larger Hibernia joined the fleet, and it was this ship which in 1847 opened the new service to New York, already fast developing as a leading American commercial metropolis.

The Steamship Evolved Rapidly

The history of the Cunard Line is the history of the development of transatlantic shipping by steam from its beginning right up to the present. The Britannia and her three sisters were wooden ships and sidewheelers. The use of iron hulls began with the Persia in 1855. In 1862 the line built its first screw steamer, the China, and her successful performance finally settled a controversy which had been raging as to the relative merits of paddle versus screw propulsion. Inverted direct-acting cylinders, a new and improved feature in marine engines, characterized the 358-foot Russia, which came out in 1867.

As ship after ship came out in the decades following the original Britannia, they became larger, with correspondingly greater capacity for passengers and freight. The steerage, carrying immigrants to America, made its appearance and rapidly developed in importance. New refinements and luxury in accommodations were apparent with each new ship.

In 1874 and 1875 the Cunard Line brought out its two largest steamers thus far, the Bothnia and Scythia, each 420 feet in length and registered at about 4,500 tons. They had straight stems, flush decks with full-length promenade and a dining saloon capable of seating all of their 300 cabin passengers at one time. Their cargo space was specially large, and they could carry 1,100 steerage passengers each. They also embodied two innovations that have added greatly to the safety of modern ocean liners: steam steering equipment and water-tight compartments.

In the 35 years that had separated the launching of the Britannia from that of the Bothnia, the steamship had made vast progress. The later ship was four times as large, carried four times as many cabin passengers and fourteen times as much freight. In addition, the Bothnia caried her 1,100 steerage passengers while the Britannia had had provisions for none. Yet the Bothnia with this greater load maintained a speed nearly twice as fast as that of the Britannia on nearly the same consumption of coal.

First Steel Cunarder

In 1881 the Servia joined the Cunard fleet. She was the first ship of

the fleet to be built of steel, the first to have electric lighting, and she incorporated the cellular double bottom. This important ship was perhaps the first of the express liners with large passenger capacity, which, however, characteristically sacrified cargo space in order to allow for larger engines and greater speed of nearly 17 knots.

Faster and Faster Sped the Ships

But marine engines were rapidly being improved, and the Umbria and Etruria, which arrived in 1884, were capable of 19½ knots working speed and as much as 21 in a pinch. These ships maintained the best average times for transatlantic crossings until the arrival of the Campania and Lucania in 1893, outstanding ships of their time, which promptly took the speed laurels with their 22-knot speed.

The Campania and Lucania were over 600 feet long and registered 13,000 tons. They reduced the time of passage to five days and eight hours with the help of their twin screws, the first to be installed aboard Cunarders. In the early part of the present century the Lucania also had the distinction of introducing wireless telegraphy on the Atlantic, certainly one of the greatest contributions toward safety in ocean travel. The new invention was markedly successful, and was promptly added to the other ships of the Cunard fleet. The advent of wireless also brought the ship's newspaper, with accounts of exciting events that were happening in the world far beyond the horizon.

For 22 Years the Mauretania Led

In 1905 arrived the Carmania and Caronia, sister ships of 20,000 tons gross, which were notable as providing floating laboratories for the newest type of marine engine, the steam turbine. The Caronia was equipped with the highest development of the older type of triple expansion reciprocating engine, but the Carmania received turbines. As a result of the successful performance of the turbines of the Carmania, the Mauretania and Lusitania, which were brought out in 1907, were so equipped. In the face of smashing competition these two ships were outstanding, and, for a few years at least, without comparison among the world's luxury ships. In fact, the Mauretania was the fastest passenger vessel for 22 years, until 1929, a remarkable record of leadership that no other steamship has ever equaled.

Just before the war of 1914 broke out, Cunard introduced the lovely Aquitania, not quite as fast as the Mauretania but much larger and a new high in luxury of accommodations.

After the World War, Cunard entered into an elaborate program of building ships of moderate size and speed to replace its losses. These include such famous ships as the Laconia, Scythia and Franconia. At this time also the older vessels of the fleet were transformed into oil-burners, making them both more economical to operate and cleaner.

The twenties saw a new problem for transatlantic shipping in the new American laws restricting immigration. Cunard, faced with the prospect of having large, unused third class accommodations, evolved Student Third Class (later Tourist Class), appealing especially to college students, with a good time aboard ship and all the wonders of Europe, at remarkably low rates. This caught on, and in the later twenties hundreds of thousands of Americans availed themselves of this economical way of seeing Europe.

Depression Problems

New problems followed in the train of the depression of 1929. Tourist traffic dropped off and steamship revenues suffered severely. Over the period of several years Cunard developed a series of short cruises of various types to appeal to the people of moderate means. Previously the comparatively small number of cruises had been operated in the winter time, and were primarily only for wealthy people with plenty of leisure time to enjoy long and elaborate itineraries.

The new cruises were operated in the summer time as well as in winter. They appealed to those who could spare only a week-end away from their offices or homes, or perhaps at most the standard American two-week vacation. These cruises were a tremendous success, and helped tide the company through the dull days of the depression.

In 1934, with the approval of the British government, Cunard merged its fleet with that of one of its largest competitors to form the Cunard White Star Line.

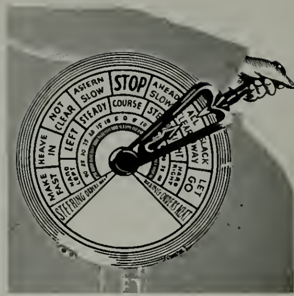
Superliners Started Controversy

The superliner Queen Mary, of over 80,000 tons, joined the transatlantic procession in 1936. Magnificently designed and decorated from stem to stern, this ship was a notable success with the public immediately. Although there had been many voices raised that the big, fast liners were impractical, the Queen Mary quickly became the bulwark of the Cunard fleet in passenger carryings. In the summer of 1939 the new Mauretania, moedrate in both size and speed, came along.

The outbreak of war in September, 1939, found the Queen Elizabeth, companion ship to the Queen Mary, still in the fitting-out basin at Clydebank, Scotland, receiving finishing touches to prepare her for the customary gala maiden voyage in the spring of 1940. But the war changed all plans, and on Thursday, March 7, the Queen Elizabeth, camouflaged in dull gray paint, slipped into New York harbor. So well had the secret of her departure from Great Britain been kept that her arrival became known only a few hours in advance.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Cargo and Stowage Questions

II CARGO MANAGEMENT

The apprenticeship stage of an officer's career as a rule affords him very little opportunity to learn much about the stowage of cargo, except possibly during certain periods when he may be employed "watching cargo" being stowed or discharged; yet, second to navigation only, this is the most important subject, or one that will affect his career more than anything else.

It must be realized that it is by the carriage of the cargo that the shipping company is able to maintain sound financial position; therefore it is essential that cargo be properly stowed and cared for to avoid heavy losses by claims against the ship.

It can hardly be expected that officers should know all about the stowage of every kind of cargo likely to be carried, but the aim should be to have a good general idea of stowage in all cases, and to be especially familiar with the fundamental principles of stowage.

It must be thoroughly understood that, although the stevedore in some cases actually loads the vessel, this does not alter the fact that in each and every case the master is absolutely and completely responsible for the stowage of cargo, and, therefore, too much attention cannot be given by the master and officers to proper stowage.

From the master's point of view, the proper stowage and carriage of cargo is all-important. He has many things to consider.

On arrival in port, he is usually informed that his ship is fixed to load a certain cargo, with possibly various options on the part of the shippers as to what goods they may or may not ship, but the disposition and stowage of all cargo rests entirely with the master and his officers.

First and foremost, he must arrange for the cargo to be stowed to prevent damage to the vessel or to other cargo; and having received, loaded and stowed the consignment on board his vessel, and signed the bill of lading, it is his sole responsibility to ensure the safe carriage and right and true delivery of the goods in the same good order and condition in which he received them.

Further, with a vessel loading for several ports, all cargo must be loaded to meet the discharge requirements to the best advantage.

The master must arrange for the stowage so that the time taken in loading and discharging is at a minimum and the cost as low as possible. It must be pointed out, however, that it is far more important to carry and deliver cargo in an undamaged condition than to study cost or economy of space.

Further, it is to be noticed in connection with stability, that in the case of a general cargo a vessel may be loaded so that she is stable or unstable with the same cargo. It depends entirely on "stowage."

It can therefore be realized that this point demands from the master not only an expert knowledge but a very heavy responsibility to ensure the safety of his vessel, cargo and crew.

From all points of view, then, it is evident that efficient stowage is one of the most important factors upon which the carriage of goods by sea depends, and it is hoped that in the following articles much information given will be of service.

QUESTION

What is the difference between deadweight cargo and measurement cargo?

ANSWER

The difference between deadweight cargo and measurement cargo is this: All cargo which stows at 40 cu. ft. or more per ton is "measurement" cargo. All cargo which stows at less than 40 cu. ft. per ton is "deadweight" cargo.

QUESTION

What is meant by stowage factor of a commodity?

ANSWER

The stowage factor of any commodity is the figure which expresses the number of cubic feet which a ton (of 2240 lbs.) will occupy in stowage, not the actual cubic measurement of

a ton, and should include a proper allowance for broken stowage and dunnage, which, as in the case of barrels or goods of irregular form and size, enter largely into the composition of the stowage factor.

The most carefully determined stowage factor is not absolute; at best it can only serve as a guide, but a useful one, inasmuch as the ratio of broken stowage varies according to whether the compartment is an end or a body compartment, wide or narrow, deep or shallow. It also varies for the same commodity for different countries and ports, according to the methods of packing, the degree of density to which the goods are pressed, whether the bags are full and well rounded, or slack, in which case they "fill solid." It also varies according to the extent to which the goods have been seasoned or ripened, as well as the quality of the crop, and whether the loading has proceeded at a normal rate, or the cargo "rushed in." In the latter case, any figure is apt to be misleading.

Notwithstanding the foregoing, a knowledge of the stowage factor, intelligently applied, is very useful to the ship's officer in arranging his stowage.

QUESTION

What are some of the approximate figures for a few of the more common classes of goods, based on experience of shipments?

ANSWER

Bags: Nitrate, 34; cement, 35; guano, 40; sugar, 42; meal, 45; flour, 45; beans, 50; rice, 50/70; seeds, 50/90; ginger, 60/80; cocoanuts, 100; nuts, 180/200.

Bales: Gunnies, 65; jute, 65; rubber, 65; linoleum, 70; cotton, 80; hemp, 90/100; cocoanut fiber, 10; esparto grass, 100; flax, 100/150; bark, 140; cork, 300/400.

Barrels: Beer, 55; flour, 60; greases, 62; oils, 60/65; whiskey, 66/72; apples, 100.

Bulk: Steel, 12; ores, 12/20; railway iron, 15; china clay, 24; patent fuel, 35; coal, 40/45; wheat, 47; copra, 75; coke, 90.

Cases: Dates, 45; figs, 50; currants, 50; canned goods, 60; preserved meats, 60; wines, 60/65; rubber, 70; cocoanut, 70; beer, 70; apples, 90; cinnamon, 100; nuts, 120; matches, 100/120; eggs, 100.

Casks: Cement, 40; molasses, 55.

Drums: Gasoline, 60; oils, 70.

Glass: 50.

Paper in rolls: 90.

Oil in bulk varies from about 36 to 43 cubic feet per ton, depending upon the specific gravity and temperature of the oil.

QUESTION

What is meant by the term "Special Cargo"?

ANSWER

This term usually is applied to goods for which special stowage, supervision and checking is considered desirable on account of the value of their contents, the ease with which abstracted articles can be secreted on the person, etc., such as cheap jewelry, fancy goods, toilet articles, wearing apparel, furs, laces, bottled spirits, and articles of value and portability generally, but not of the kind which are classed as "precious" or "valuable" goods, for the safe custody of which a specially-constructed "strong" or "specie room" should be provided.

Samples, addressed packages and those which, from their small size, etc., are unsuitable for "ordinary" stowage, are also included in the description.

QUESTION

What is sweating, and how is it caused?

ANSWER

Sweating is the condensation of moisture on the iron and steel in the holds of a ship, and is caused by the shell being at a lower temperature than the hold. With some cargoes, sweating is more excessive than with others, because they give off a great deal of moisture into the air, whereas the others give off very little moisture. Such cargoes as sugar, salt, etc., are conducive to excessive sweating, and with cargoes of flour, lime, etc., there is little or no sweating at all.

QUESTION

What should be done to protect a cargo from moisture in transit?

ANSWER

The careful selection of goods for stowage with or near wet or moist goods.

The placing of wet and moist goods in compartments where, by the absence of local heat, and through ventilation, evaporation and condensation are retarded.

Correct dunnaging and matting; also, adequate separations where the nature of goods stowed one over the other, etc., demands it.

QUESTION

How do you prepare a hold for cargo?

ANSWER

Sweep the holds clean; the remainder of the preparation would depend upon the character of the cargo to be taken on board. Make sure that all waterways and bilges are free from coal dust, loose grain or any other rubbish left from previous cargoes, and that all rose or strum boxes are clear. Have plenty of good mats and dunnage suitable for the cargo that is coming in.

QUESTION

What precautions should be taken when receiving cargo?

ANSWER

When about to take in any cargo, if you have not been with similar cargoes before, you should ascertain as much as you can as to its nature, and what precautions are necessary with respect to it.

Evidently it is necessary to note particularly the odor and condition of cargo when first received, and not to give a clean receipt for it unless its condition warrants it, otherwise the ship may be held responsible for loss or damage which it may have received prior to being shipped.

QUESTION

How should dunnage be laid for general cargo?

ANSWER

The modern steamer is so designed that dunnage, except for choking and filling between battens (when necessary), is largely dispensed with.

Rough spruce planking is usually employed, and this is used where needed; baled goods, liable to damage through sweat, are protected with a layer of planking over the steel decks and against the framing of the ship.

Dunnage is also used in flooring off between different kinds of cargo where contact would result in damage. No hard and fast rule can be given as to the amount of dunnage needed for any ship, but each cargo is a rule unto itself in this respect. Good stowage calls for sufficient dunnage to prevent damage by contact or leakage, and enough chocking pieces to prevent the working or

shifting of cargo when in a seaway.

Most modern vessels have permanent dunnage or ceiling covering tank tops, consisting of 3-inch planking resting on bearers about 2 inches deep, which form an air space between the tank top and the ceiling to dry up moisture.

Portable side battens, consisting of boards about 6 inches broad and 2 inches thick, spaced about 9 inches apart, are fitted into cleats on the side framing of the ship; the battens may be arranged horizontally or vertically, and sometimes diagonally. Fireroom bulkheads are usually fitted with battens and other bulkheads also. This permanent dunnage is usually sufficient for rough cargoes and for goods that are not liable to absorb moisture.

Additional dunnage should, nevertheless, be laid at the bilges where water is likely to accumulate; also on stringers and stringer plates, where moisture from condensation or otherwise may trickle down the shell plating and framework of the ship and lodge on the stringer.

Matting should always be laid on the ceiling for bale goods and bag cargoes, and if the nature of the cargo is likely to draw moisture, an additional 2 or 3 inches of dunnage should be laid on the ceiling and at the turn of the bilges.

QUESTION

What is the usual order of stowage for general cargo?

ANSWER

In the deep holds, only heavy and securely-boxed or crated cargo should be placed below, for the weight of stowage on top will cause considerable damage unless this is attended to.

Stowage generally takes the following course:

Lower Holds: Heavy weights, stout packages, deadweight cargo; followed by measurement to lower 'tween deck beams, using small cases for beam filler, if possible.

Lower 'Tween Decks: Heavy stuff, steel rails, billets, etc., casks and measurement.

Upper 'Tween Decks: Some heavy stuff to carry up the weights, and mostly measurement cargo.

The order of stow depends largely upon the order of discharging. Consignments for any single port should be kept as close together as possible.

So many factors enter into the practical work of stowage that only general principles can be given. Never allow drafts of cargo to bang against the side when loading. Heavy slings of cargo will batter in the shell plating abreast of the hatch ways.

The cargo should be so distributed as to make the vessel stable. Too much must not be placed in the extreme ends of the vessel, as it would cause "hogging." Neither should too much be placed in the middle of the vessel, as it would cause "sagging." About two-thirds of the weight should be placed in the lower holds, and one-third in the 'tween decks.

QUESTION

If you were stationed in the hold to look after the interests of the ship during loading of general cargo, what would you consider it your duty to do?

ANSWER

I would inspect the cases or packages as they came on board, and if any appeared to be damaged, notify the chief mate at once before he gives a receipt for it. I would see that any directions printed on any package were observed whilst being stowed, such as "This side to be stowed uppermost," or "Stow away from the boilers," or that hooks were not to be used for bale goods, etc. I would particularly guard against broaching or stealing of any cargo, and see that all was properly stowed and blocked off securely. Should not stow liquids above solids if it is possible to avoid doing so.

QUESTION

What would you look out for in the hold whilst discharging?

ANSWER

As before, I would prevent any broaching, and see that no cargo was damaged by rough or improper handling. If any cargo appeared to be damaged, I would call attention to it before disturbing it, so that, if necessary, it might be surveyed.

QUESTION

. What is done when damaged cargo is found? Give the reasons for doing so.

ANSWER

When damaged cargo is found, it must not be disturbed in any way. The chief mate must be informed of it, and he in turn will inform the master, who will have it surveyed by two merchants well experienced in dealing with all such cargoes. They will give a report, stating just how the cargo was dunnaged and protected from likely damage, the reasons for this being that if the cargo has been damaged because it had been improperly stowed or insufficient dunnage used, the ship will have to make good the damage; but if, on the other hand, all precautions necessary and possible were taken to prevent the damage, then the loss falls on the merchant.

An Answer

by An American Shipmaster

With reference to an article, "Signaling in the U. S. Merchant Marine," appearing in *Pacific Marine Review*, March, 1940, on page 43, as a deck officer of the American Merchant Marine I would like to state my own opinion of the matter.

The article as printed is a reflection on all deck officers, and bears correction. If the deck officers are "grossly ignorant" of the use of Morse code by signal lamp or flag, it would be well to find out why and lay the blame at the proper doorstep instead of dumping it on the deck officers as a whole. The deck officers of the American Merchant Marine are probably not as ignorant of signaling procedure as others are of merchant marine procedure and facilities.

Before any shots are fired for failure to respond to blinker signals, an investigation could be made to determine whether all merchant vessels are equipped with adequate blinker lights or even suitable flashlights for close contacts. Probably they are not. It has never been of any great concern to Naval authorities to see whether American vessels had Morse lights or

even means for establishing contact by semaphore or International code flags, and this is true even on those vessels designated as suitable for use as Naval auxiliaries in time of war.

In the past, when a deck officer sat for a license before the local inspectors of the Bureau of Marine Inspection and Navigation, the usual procedure for handling questions pertaining to "Signaling by Blinker" was to hand the applicant a sheet of paper bearing several names or words, with the instructions to write down the Morse code equivalents. If answered correctly, it was generally considered the applicant understood, and was familiar with, "Signaling by Blinker."

If a vessel was equipped with blinker light facilities, considerable practice could be had at sea. Sending is easy. Receiving requires a partner and considerable practice. To make a long story short, human nature being what it is, and in view of the circumstances outlined above, there never was much practice . . . except on passenger vessels. Very often attempts by Naval vessels to contact merchant vessels resulted in failure because the deck officer was no match for an expert signalman operating yardarm blinkers, which, incidentally, more than exceeded the present prescribed rate of six five-letter words per minute. A good number of the successful contacts were completed with the assistance of the radio operator. After all, he is the communications officer.

Recently the U. S. Navy has been attempting to contact American merchant vessels in broad daylight with large searchlights fitted with Morse shutters. (*This writer does not recall ever being on any American merchant vessel that was so fitted, nor has he ever heard of any such vessel.*) This shows just how much the U. S. Navy knows of the facilities available on board a merchant vessel. It is to be presumed that if the deck officer does not answer such signals, the vessel will be reported to the Bureau of Marine Inspection and Navigation for proper action.

For those who do not understand the manning of an American merchant vessel, it may be well to state briefly the bearing of this important factor on this question. On the average American freighter the deck officer is on the bridge alone, with the exception of the wheelsman, and at night the captain is not on the bridge unless it is foggy, or if in close quarters. The deck officer has no signalman on board at his call, and must rely solely on his own resources or call the captain, radio operator or another officer, which is not always practical or in keeping with good judgment. In coastal waters, with fishing and other vessels approaching, and crossing or navigation aids to be checked and passed in the vicinity, it is not always possible for the deck officer to divert his attention from the existing situation merely to answer a few trivial questions. Trivial questions, because the average deck officer is not so credulous as to believe that blinker signals are a means of positive identification.

The primary duty of the deck officer is safety of the vessel, passengers, crew and cargo. The safety record of American merchant vessels, regardless of age or type, establishes the fact that this job is done well.

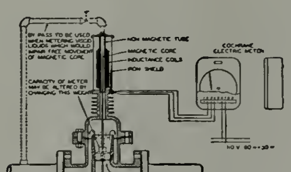
In conclusion, sincere cooperation and understanding by the Navy, the Maritime Commission, the Bureau of Marine Inspection and the deck officers as a whole, together with the modification of some of our existing maritime laws, could establish an easy system to check up on all deck officers to see if they were really capable of signaling by blinker.

Deck Officers' Licenses for June

Name and Grade	Class	Condition
SAN FRANCISCO		
A. Rathke, Chief	SS, any GT	RG
L. W. Abramson, Chief	SS, any GT	RG
A. M. Valen, 2nd Mate	SS, any GT	RG
W. L. Bewley, 2nd Mate	SS, any GT	RG
R. E. McCarthy, 2nd Mate	SS, any GT	O
E. H. Evans, 3d Mate	SS, any GT	O
R. C. Olund, 3d Mate	SS, any GT	O
C. R. James, 3d Mate	SS, any GT	O
H. C. Frey, 3d Mate	SS, any GT	O
C. V. Thorstenson, 3d Mate	SS, any GT	O
SAN PEDRO		
C. F. Carroll, 2nd Mate	SS, any GT	O
L. E. Davis, 3d Mate	SS, and GT	O
C. E. Large, 3d Mate	SS, any GT	O
SEATTLE		
S. G. Nelson, 2nd Mate	SS, any GT	O
JUNEAU		
B. Aspen, Master	SS & MS, 750 GT	RG
2nd Mate	SS & MS, any GT	

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

Measures Flow of Fluids on Shipboard

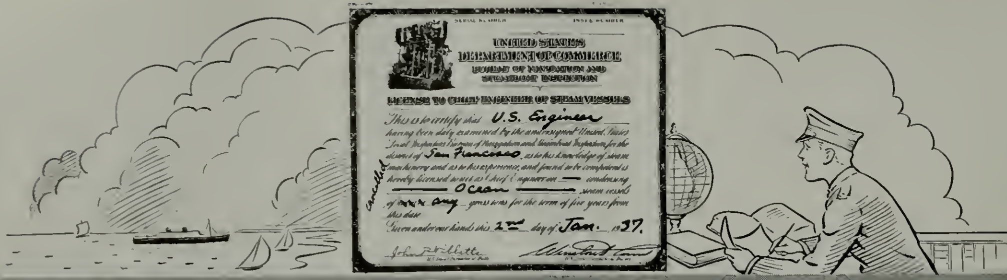


The new area type flow meter developed by Cochrane Corporation can be used to advantage on shipboard installations to measure the flow of boiler feed water, steam generated, and in other services where the ordinary type flow meters are inaccurate, due to pitch and roll of the ship.

Among the features which distinguish the Cochrane Linameter are minimum error resulting from ship roll, and ability to locate the meter body against adjacent valves and fittings without the necessity of straight pipe runs. Tests show a list as great as 25 angular degrees from the vertical has remarkably small effect on accuracy.

The body of this meter is installed as an integral part of the pipe line, and a weighted disk positioned by the velocity of fluid through a tapered throat section moves a magnetic core within a galvanometer bridge circuit to remotely record the flow of fluid on a twelve-inch circular chart. The meter uses no mercury, pistons, rotating blades or other wear-affected parts which can cause inaccuracies.

The meter is made in different combinations of indicating, recording and totalizing features to suit particular conditions, and may be equipped with pressure and temperature pens to record on the same chart with flow. Complete descriptions are included in Publication 2100, by Cochrane Corporation.



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Marine Boilers III

LIGAMENTS

The meaning of the word ligament is much as the word implies. It is that portion of a member under stress which, because of a reduced sectional area, has an increased concentration of load or an increased stress. Thus the ligament of a stress member is its weakest part.

The cylindrical surface of a boiler, regardless of where located, is under pure tension, with the longitudinal stress one-half of the circumferential stress. (This was developed in our last article. See July issue, *Pacific Marine Review.*)

Obviously any holes drilled in the surface remove metal useful for carrying a load, hence increase the stress in the metal or ligament between holes. If half the metal is removed the stress is doubled; or, what amounts to the same thing, the allowable working pressure, W, is reduced to half of the value computed without any holes. This reduction can be partially recovered, in the case of holes for rivets, by making the rivets small and using a second, third or fourth row of holes to gain back the loss in rivet strength due to small holes. This is because of the fact that additional holes back of the first ones in the line of stress do not further reduce the area. For instance, if 25 per cent of the metal is drilled out for a first row of holes, another row back of it removing not more than 25 per cent of the metal would not further weaken the plate and it would still be 75 per cent efficient. If, however, the second row is too close to the first, or if the holes are staggered, then we may be forced to make some reductions to the first row efficiency of 75 per cent. This reduction for succeeding rows of holes is the subject of section C9, page 73, in the 51st Supplement, with the graph, figure C24, therewith.

With the Scotch boiler, there was no occasion for putting the tubes so close together as to leave no ligament; furthermore, the holes were in a flat tube sheet, wherein the tubes acted as stays, and there was little or no stress in tension on the metal of the plate.

With modern boilers, however, it has been more and more imperative to terminate the tubes in cylindrical surfaces under a tension load. Furthermore, for the walls and perhaps the roof of the combustion space, it is desirable to have the tubes as close together as possible. Where the tubes touch each other they are called *tangent tubes.* If tangent tubes entered the drum directly they would leave no ligament strength at all. This accounts for the fact that tubes have not been used as a furnace wall much in the past. However, by using smaller tubes, bending them in complex shapes, it is possible to have tangent tubes which, as they approach the drum, bend and enter it in different rows of holes, each row having a fair proportion of metal between holes and a fair ligament efficiency. Patented headers are also available which permit the use of almost tangent tubes.

Holes for tubes may have an irregular pitch. This is principally for the reason that the pitch or distance between holes is so small that, if uniform, a blown or damaged tube could not be removed from a nest of tubes. If the distance between the walls of tubes is less than the diameter of a tube, it could not be removed. By putting two close together, then a larger space, then two more, any tube can be removed. Sometimes they will be grouped in sets of two close spaced, then three, then two and so on.

To compute ligament efficiency for the regular or uniform pitch, only one pitch of the row length need be considered, and Formula 8 applies.

If the pitch is irregular, then a length of the row must be considered which will include enough holes so that large pitch and small pitch reoccur in a ratio equal to their proportion in the whole row. Then Formula 9 applies. A simple glance at these formulas shows that they are nearly an expression of the fraction of good metal remaining divided by the metal before drilling. These formulas also apply if the holes are in line with each other in more than one row; that is, back of each other, not staggered. The

efficiency of the whole will be that of any row.

If the rows are staggered, then the holes in the second row cut into the ligament of the first row, and may weaken the combination to a lower efficiency than that of one row. Whether a reduced efficiency is needed or not depends on the spacing between rows. If the holes in the second row do not fall within a circle drawn with a first row hole as a center and a radius equal to the pitch, then no reduction is necessary. This means that the diagonal pitch, P_d, is greater than the longitudinal pitch, P, and if staggered uniformly, that the spacing between rows must be more than 87 per cent of pitch, P.

However, it may be desirable to make the row spacing less than 87 per cent of P, and the diagonal pitch, P_d, will be less than P. This means that the efficiency of the combination will be less than that of one row. The new and reduced efficiency will be found by using the graph, Fig. C24, in 51st Supplement, facing page 74.*

Compute the ratio of diagonal and longitudinal pitch (see Formula 10), and locate the sloping line on chart which represents this ratio. Then find the normal efficiency of one row and locate it on the scale at the bottom of the chart. Find where this point, extended vertically, intersects the ratio line, and from there move horizontally to the left to scale, where the new, reduced efficiency can be read off directly.

Our next article will continue with boilers.

Engineers' Licenses for June

Name and Grade	Class	Condition
SAN FRANCISCO		
R. H. Douse, Chief	SS, any GT	RG
B. W. Godfrey, Chief	SS, any GT	RG
W. B. Coles, Chief	SS, any GT	RG
D. Buchanan, Jr., Chief	SS, any GT	RG
J. J. McGarry, 1st Asst.	SS, any GT	RG
D. Auyong, 2nd Asst.	SS, any GT	RG
J. C. Gray, 2nd Asst.	SS, any GT	RG
C. E. Anderson, 2nd Asst.	SS, any GT	RG
R. Deckx, 2nd Asst.	SS, any GT	O
N. J. Leasure, 2nd Asst.	SS, any GT	O
J. P. Bayer, 2nd Asst.	SS, any GT	O
H. J. C. Miller, 3d Asst.	SS, any GT	O
M. Faria, Jr., 3d Asst.	SS, any GT	O
E. I. Brown, 3d Asst.	SS, any GT	O
H. E. Olsen, Chief	MS, any GT	RG
A. G. Sorlom, Chief	MS, any GT	O
SAN PEDRO		
C. E. Markey, Chief	SS, any GT	RG
T. L. Skillington, Jr., Chief	SS, any GT	RG
W. P. Almand, 2nd Asst.	SS, any GT	RG
H. O. Reaves, 2nd Asst.	SS, any GT	O
J. A. Raeish, 3d Asst.	SS, any GT	O
L. L. Sunde, Chief	SS, any GT	O
A. H. Hedberg, 1st Asst.	MS, 750 GT	O
PORTLAND		
E. H. Hellis, 2nd Asst.	SS, any GT	RG
SEATTLE		
W. A. Keefe, 1st Asst.	SS, any GT	RG
C. E. Hancke, 3d Asst.	SS, any GT	O
J. L. Wright, 3d Asst.	SS, any GT	O
F. Jonassen, 3d Asst.	SS, any GT	O
HONOLULU		
P. L. Hong, 2nd Asst.	SS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tunnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

*Unfortunately, the printed small letter l is identical with the figure one. On the graph, and in the text referring to the graph, the 51st Supplement used P to mean longitudinal pitch to differentiate it from P_d diagonal pitch. Yet on the same page, under symbols, they state that P is longitudinal pitch and P_1 or P (one). is length of section, which mey be many times pitch, P. In our formula figure we use only P to represent longitudinal pitch. Readers are cautioned to avoid confusion in reading the Supplement.

Letters from the Ships

"The Chief"
Pacific Marine Review
San Francisco, Calif.

Sir:

Many thanks for your immediate reply to my questions. Would also like to tell you how the engineers appreciate your section of Pacific Marine Review. There are several of the engineers that have each of your issues made up in book form and use them for reference. Would you reserve a small part of your monthly section for answering questions on diesel motors, as I am sure your questions will increase from the engineers on the motorships?

We all look forward to getting our issue of Pacific Marine Review just to get "The Chief's" section, and I sincerely hope that you keep up the good work. I know that you must have helped many engineers with their examinations.

Very truly yours,

O. L. H., 1st Asst. Engineer,
New York.

"The Chief" very greatly appreciates the sincere expression of interest contained in this letter. Let diesel engineers rest assured that their letters and questions are more than welcome.

The program outlined for this section will include diesel subject matter after boilers, thermodynamics and electricity have been covered. It may be some time before that subject is reached. However, all can be assured that any questions sent in from ships will be promptly answered. either personally or in this section. If the diesel engineers will write in any specific questions, they will be given attention.

Readers will notice that this section is presenting the subject in a consecutive, connected manner. This indicates that the questions used are not those sent in by readers or worded by engineers, but are questions that "The Chief" has accumulated over years of experience in talking with engineers and counseling with ships' personnel. Questions sent in from ships are answered immediately by letter or in this section, whether or not they fall into line with the current subject matter, and if suitable are presented under the heading "Questions from Ships."

With this in mind, will diesel engineers please feel that they are welcome to come in and join the class, even though for the moment we may be discussing steam engineering? The time will come when perhaps for a year or so we will be on diesel only, and the steam engineers must be made to feel welcome.

Sincerely,

"THE CHIEF."

"The Chief"
Pacific Marine Review
San Francisco, Calif.

Sir:

We have been having a friendly and instructive argument about this boiler stay problem. "Find the load on a stay when the pitch of stays is 18" in one direction and 16" in the other. Find the minimum diameter of stay when the allowable stress on the material is 9000 lbs. per square inch; the working pressure on the boiler being 210 lbs. gage."

One group argues that as the load on a boiler stay is $P^2 \times W$ when the pitch is different, the load will be found by taking the mean of the squares of the pitches, or Formula No. 1, where P=long and p=short pitch The other group claims that the area supported must be $P \times p$, as being the area of the rectangle supported by each stay. Then the load is Formula No. 2. Applying the Formula No. 1, we have No. 3. By the other, No 2, we have No. 4, and the diameters then are as shown in No. 5.

The difference is negligible, apparently, but the difference would be

greater when the variation of pitches was greater. Which method ought to be used?

Yours truly,

W. A. L.

San Pedro, Calif.

This very interesting letter illustrates a form of mathematical confusion which is very common in the profession.

The problem is simply that of whether the area of any rectangle is the average or mean of the sides squared, or whether it is simply that of the product of the two sides.

To square the sides, add, and divide by two is, of course, wrong. There is not the least evidence of theory to support this method. Nor is there any reference in the General Rules and Regulations to indicate it. Formulas 1 and 3 are definitely wrong. Formulas 2 and 4 are correct.

The area of any rectangle is simply the product of its two sides. If the sides are equal, hence a square is involved, the same result will be obtained by the two methods. But as the difference between the two sides becomes greater and greater, the error increases rapidly until it is enormous. For instance, suppose the sides were 2 and 10. Then by (1) area would be ½ of 4+100, or 52. By (2), area would be 2×10=20, a difference of 32. The result by (1) will always be a greater area, hence a greater load, than by (2).

The correct formula to use in this problem is shown on page 71 of 51st Supplement to *General Rules and Regulations,* and is working pressure, W, is equal to the area of the stay divided by the area supported by the stay, and this ratio multiplied by the allowable stress in the stay, varying from 6000 to 10,000 lbs., according to the kind of stay. See Formula No. 6.

Perhaps the confusion came about from the formula for thickness of the plate stayed, given on page 65 of *General Rules and Regulations,* 51st Supplement. See Formula 7 herewith. This contains the sum of the squared pitches, but not the average. This formula disregards loading on stay entirely, and considers only the thickness of the plate. As the pitch increases, the plate, acting as a bridge supported only at the stays, bends under the load. To increase the pitch, using larger stays, also means to increase thickness of plate to stand increase of load on the bridge. It can be shown that the strength of the bridge increases as the square of the thickness. But also it can be shown that the load on the bridge increases the stress in the plate proportionally to the square of the pitch. The constant is purely arbitrary, and is the result of experience. The complete theoretical formula would be too complex to be practical in the *General Rules and Regulations* and *A. S. M. E. Boiler Code.*

To summarize: Formula 6 only is correct to compute diameter of stay; Formula 7 is only for computing the thickness of the plate.

"THE CHIEF"

(1) $$\frac{P^2+p^2}{2} \times W \qquad \text{WRONG.}$$

(2) $$P \times p \times W$$

(3) $$\text{Load in pounds} = \frac{(18\times18)+(16\times16)}{2} \times 210 \qquad \text{WRONG}$$

$$= \frac{324 \times 246}{2} \times 210 = \frac{580}{2} \times 210 = 60{,}900\text{ Lbs.}$$

(4) $$\text{Load in Lbs} = 18 \times 16 \times 210 = 60{,}480\text{ Lbs.}$$

(5) $$\text{Diam. of stay by (3)} = \frac{60{,}900}{9000} = 6.76\,\square'' \qquad \sqrt{\frac{6.76}{.7854}} = 2.93'' \quad \text{WRONG}$$

$$\text{Diam. by (4)} = \frac{60480}{9000} = 6.72\,\square'' \qquad \sqrt{\frac{6.72}{.7854}} = 2.92''$$

(6) $$W = \frac{aC}{A} \quad \text{or,} \quad a = \frac{WA}{C}$$

a = area stay.
A = area surface.
C = allowable stress.

(7) $$W = \frac{CT^2}{P^2+p^2} \quad \text{or,} \quad T = \sqrt{\frac{W(P^2+p^2)}{C}}.$$

T = Thickness in $\frac{1}{16}$ inches

(8) $$E = \frac{P-d}{P}$$

E = efficiency
P = pitch.
d = diameter of hole.
C = a constant varying from 136 to 340 according to Location, and kind of stay

(9) $$E = \frac{P_1 - nd}{P_1}$$

P_1 = length of row
n = number of holes in P_1

(10) $$\text{Ratio} = \frac{P_d}{P}$$

P_d = diagonal pitch
P = pitch in row = Longitudinal pitch.

True and false formulas for strength of boiler stays

Vibration Insulators

An unusual application of rubber for vibration dampening is reported by the B. F. Goodrich Company in the use of its No. 10 Vibro-Insulators by the owner of a large sailing yacht to insulate his dining tables from the vibrations of diesel generators used for the lighting system.

The metal parts used in this Vibro-Insulator application are of bronze, to resist the corroding action of salt spray.

In previous efforts to insulate the vibration, each of the tables had been weighted with 500 pounds of lead, but even then the vibration had been annoying. The use of rubber for this purpose completely solved the problem.

Santa Ana Makes Her Bow

Some Random Thoughts On a Trial Trip

by O. B. Whitaker

Manager, Marine Department, Sperry Gyroscope Company

In the Stygian darkness that precedes the dawn as a back curtain against which each electric light seemed like a bright sun, I sought my way among the buildings of the Newport News Shipbuilding Company's yard to where the new Grace liner Santa Ana, a Maritime Commission C-2 designed vessel, lay at her dock. As the space between the large buildings which framed her opened up, her lights flashed into view like a brightly lighted city. This day, still so young, was to witness her second coming-out party. The first, her builder's trials, was a family affair where faults might be discovered and corrected before her first public appearance, on the threshold of which she now stood.

Promptly at 6:00 o'clock the gangway was hoisted clear by a yard crane, lines were singled, and everything put in readiness to back out of the slip and head out to sea for the trials. Captain Roger Williams, Vice President of the Newport News Shipbuilding and Dry Dock Company, representing the builders, however, had already decided that with the lighted buoys removed from the channel because of ice in the river, it would not be well to leave the dock until daylight, which was being impeded by a leaden sky that threatened to turn on the meteorological faucets and pour forth either rain or fog at any moment. Finally at about 6:45 daylight showed signs of winning what had seemed a struggle against great odds, and soon the signal "Slow astern" was given by Pilot-Captain R. A. Callis.

To me this is one of the great moments of a ship's life. There will be no demand made of her on this trip of which she has not previously proven herself well capable; but this time she is performing before an audience, an audience which is not there to applaud her beauty or her acting but one that is expert in finding the slightest faulty tone, misbehavior or other shortcoming, aided and abetted by delicate instruments that are no respecters of art or beauty. No opera star ever performed before a more critical audience. The first engine order was the signal for the curtain to rise, with the Santa Ana in the center of the stage, poised to start her career. The faint quiver that ran through her was like the nervousness that besets a performer who appears before an audience for the first time.

Her lights flashed into view like a brightly lighted city

Yet there was no doubt in Captain Callis' mind when he stepped to the engine telegraph and with a broad sweep of the handle brought it to rest on "Slow astern." The faith which the skipper has in the chief engineer is quite manifest regardless of all those banterings which occur between them.

It would be interesting, at least, to witness an occasion when the skipper gives an engine order in such circumstances and nothing happens, a really sacrilegious thought, I know, but one which nevertheless persists.

When clear of her pier, her stern was swung up river and her prow turned toward the channel that leads to Hampton Roads, past Old Point Comfort, Cape Henry and on out to sea to Chesapeake Light Vessel which lies well out from the "Capes." Soon after getting squared away in the river, we passed the Anniston City, a veteran of many world encircling voyages under the house flag of the Isthmian Line, and a little further on met the Gulftide of the Gulf Refining Company. Both ships greeted the Santa Ana with the sailors' salute to a newcomer in their midst, three long blasts from the whistle, both of which greetings were proudly acknowledged.

Some distance seaward from the light vessel she was put through a few numbers that in no way taxed her real abilities but which were disposed of first to give her a chance to warm up to the real tests to follow. Finally the hour arrived when she must demonstrate to her critical audience that all conditions of the contract can be met: speed, oil con-

Anniston City and Gulftide salute Santa Ana

sumption and a myriad other tests which, with a statement of all their details, look like a Webster's Unabridged Dictionary. Another broad sweep of the engine telegraph was made, with the handle coming to rest pointing at about the juncture of the forward wheelhouse bulkhead with the deck. No mistake here, the skipper had asked for full speed ahead. The slight quivers that ran through the frame of our debutante this time were a little higher pitched but without the slightest sign of faltering at the task that lay ahead. Just like any good performer, she soon struck her stride and settled down to her role in the aria "A Good Ship am I," with her prow cutting the broad Atlantic toward the sunrise.

Always fascinated by the steering action of a ship, I had been closely watching the wheelsman apply a little "wheel" to the right and then to the left as he kept the ship headed according to the conning instructions of the Captain. Good steering gear, obviously in excellent condition, right from the steering wheel of the American Engineering Company's hydraulic telemotor to the rudder, for a "wheel" turn of a fraction of a spoke produced rudder movement. Also of great importance, the ship responded perfectly. "This ship will make a course as though she were on rails when automatic steering is used," I concluded just as the Captain called to William Smith, the Sperry Service Engineer who had supervised the installation of the Gyro-Compass, Gyro-Pilot and other Sperry equipment, and seen them secured, wired and tested to the last detail. "You may put her on automatic steering now, Mr. Smith, if you are ready."

"Aye, aye, sir," replied Smith as he stepped to the equipment's steering stand and clicked the control lever to "Gyro-Pilot." "On automatic steering now, sir," reported Smith to the Captain.

All eyes are directed immediately toward the Rudder Indicator as everyone is curious to see how well this modern wheelsman is going to direct its charge on a desired course, for no test at the dock can predict how a vessel will respond to its rudder. The rudder "moved" to 4 degrees to starboard and, after holding there for nearly a minute, "moved" back to 2 degrees starboard (yes, starboard, for she was carrying an average of 3 degrees of rudder on that side) and with no apparent change of the vessel's heading. Although all conditions were favorable for good steering, one could not help but be impressed with the performance of a device that could hold a ship to its course as closely as anyone could read the compass and with a total rudder movement of only two degrees.

Full out now, the Santa Ana performed like a veteran. After watching the course recorder for several minutes, with the course pen drawing an almost straight line, I went below to look around the engine-boiler room (hyphenated because they are in the same compartment), with the boilers set just abaft the engines. Somehow no visit to the engine room is complete without a look at the thrust bearing housing, for that to me is sort of a symbol. It is where the output of the powerful engines is concentrated in the "push" that shoves the ship through the water. The propeller converts rotating motion to thrust which is carried along the shaft to the thrust bearing where the rotating motion is dropped and only the thrust or push is delivered to the ship's hull. Like most of the engine room machinery, this important part of the ship has been so reduced in size and so completely housed-in that it is not easy to find. But, there it is, appearing to be a part of the forward housing of the main reduction gear. The output of the whole power plant is being concentrated there in push. Only the long rows of thrust blocks, with streams of water pouring over them to keep their babbit faces from going liquid in the terrific heat generated by their friction losses are missing, seldom seen now except on those veteran ships which seem to possess the nine lives of the village tomcat.

After lunch we return to the bridge to find that the ship's performance has settled down to a uniformness verging on monotomy. We have run out our time on the easterly heading and are heading back toward Chesapeake Light Vessel with the idea of finishing our eight hour full power run nearby.

When there was less than an hour to finish the full power run, Captain Williams who had been peering ahead nervously asked of Captain

Aided and abetted by delicate instruments the Trial Board looks for faults

"You may put her on automatic steering now, Mr. Smith." The gyro pilot takes over

The text and cuts of this article used through courtesy of The Sperryscope.

Callis, "What is that ahead, Captain; is it fog?" "Yes, I believe it is," replied Captain Callis. Sure enough, in a few minutes we found ourselves entering one of those fog walls which are no friend of the mariner. "Bring her about to an easterly heading again," ordered Captain Williams, adding that turning about would, no doubt, take us back into an area of good visibility. This was a crucial moment as slowing down then would have necessitated a re-run of the whole full power run. In no time we had left the fog back to the westward and were again in an area of good visibility but heading away from home.

The end of the full power run found us a considerable distance off shore and probably somewhat north of a line due east from Chesapeake Light Vessel. The Captain therefore ordered a course of 268, and after a short time we found ourselves again in the fog we had left behind earlier in the afternoon. Speed was reduced and due precaution taken for steaming under reduced visibility. The Kolster radio direction finder, with which true bearings of a radio beacon can be obtained on a Gyro-Compass repeater card, was put into service. The course was then changed slightly to put the vessel on a heading corresponding to the line of bearing with the Chesapeake Light Vessel, and frequent bearings were obtained

Above: The course recorder indicates that under gyro pilot control Santa Ana steers as though she was on rails.

At right: The fog clears, and Captain Callis confirms his position by bearings on the Sperry repeater

on Winter Quarter Light Vessel lying to the northward almost on our starboard beam. These bearings when plotted on the chart indicated our progress, and at 11:30 P.M. we dropped anchor about three miles east of the Chesapeake Light Vessel. We remained at anchor until 10:00 A.M. the following day when the fog lifted. We reached the shipyard about 12:30 P.M.

Everyone seemed to be satisfied with the equipment over which he had jurisdiction, but somewhat like a presidential election, it takes a long time to count the ballots or to compute the data accumulated during those few hours.

Even though it was raining when we arrived at the shipyard, I paused on the gangway long enough to admire the grace and beauty portrayed in the lines of the Santa Ana and almost believed that I could discern an air of pride in them that could come only from the satisfaction of having met one's critics with completely acceptable results.

We all hope for the Santa Ana a long and successful career.

Santa Ana sailed on her maiden voyage Friday, March 1, to Panama, Colombia, Ecuador, Peru and Chile.

Adapted to the South American trade from the Maritime Commission's basic C-2 design, she is 459 feet overall, with a 63-boot beam, a draft of 25 feet and 9 inches, a displacement of 13,589 tons, and a speed of 15½ knots.

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

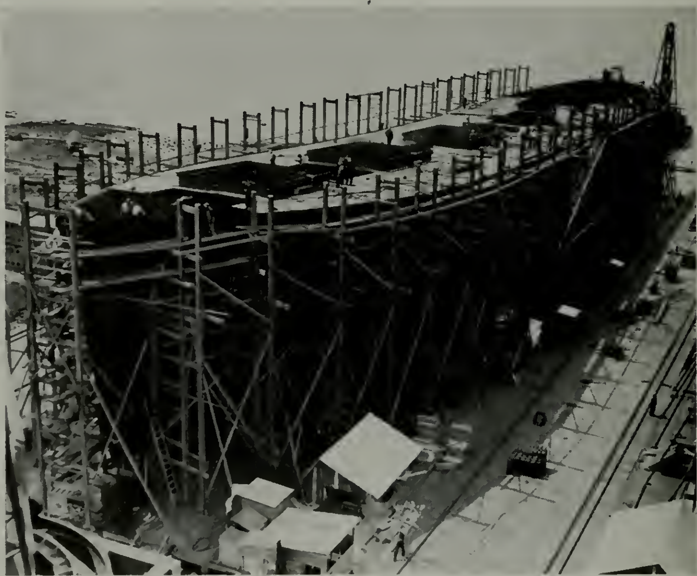
Pacific Coast Launchings

The Maritime Commission shipbuilding program on the Pacific Coast is now fast working into the launching stage, and so will be more in the public eye. There is something fascinating to the man and woman of the street in the act of launching a ship. Here is this hull, representing months of work by hundreds of men. She is standing propped up on dry land, stiff, rather ugly, surrounded by scaffolding, cranes and other equipment incident to her construction; and now, at a signal, the pushing of a button, she is to slide into her proper element and suddenly becomes a thing alive, full of grace and beauty, afloat on salt water.

This act captures the imagination; it has been put into verse by many poets; it is likened to birth—to marriage—to all that is life-giving.

The months ahead are to see many launchings on the Pacific Coast, and the publicity given to these occasions will be of immense benefit to the shipbuilding and the shipping industries.

First of the series will be the first launching of a C-1 ship. This will take place August 1 at 4:30 p.m. at the Seattle-Tacoma Shipbuilding Corporation yard at Tacoma. She will be christened by Mrs. John Boettiger, wife of the publisher of the Seattle Times, and daughter of the President of the United States, and will be named Cape Alva.



S. S. Cape Alva, first C-1 at the Tacoma yard of Seattle-Tacoma Shipbuilding Corporation, launched August 1.

Second launching of the month will come on August 6 at the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company, Inc., San Francisco, Calif. This will be the second launching of a Maritime Commission C-1 ship. She will be christened Cape San Martin, and will be sponsored by Mrs. J. Lewis Luckenbach, wife of the president of the American Bureau of Shipping.

Western Pipe & Steel Company will launch their first C-1 on August 8 at their South San Francisco plant. This launching is of especial interest, because it will be the first sidewise launching for the Maritime Commission, and the largest all-welded hull yet built on the Pacific Coast. She will be sponsored by Mrs. K. D. Dawson, wife of the Pacific Coast manager of the Panama Pacific Line, and christened American Manufacturer.

Then, on September 4, Moore Dry Dock Company will launch the fourth C-3 cargo vessel for the Maritime Commission. She will be christened Sea Dragon.

The construction of Sea Dragon is making somewhat of a record. Her keel was laid June 20, which makes 54 working days to her launching.

Commercial Completes a Barge

The Commercial Iron Works of Portland, Oregon, on July 10 delivered to the U. S. Army Engineers Corps at Bonneville, Oregon, a welded steel gasoline barge 20 feet beam and 60 feet length.

Mare Island Gets Four Orders

During June, Mare Island Navy Yard received orders for the construction of one submarine tender and four submarines. The yard already had under construction two submarines, one submarine tender, two fuel barges and a seaplane wrecking derrick. In addition to this new construction, Mare Island Navy Yard is very busy on the reconditioning of destroyers and the routine maintenance and repair of many types of naval vessels.

Puget Sound Gets Two Destroyers

Orders for two destroyers for the U. S. Navy were received by the Puget Sound Navy Yard, Bremerton, Washington, during June. This yard has under construction, in addition to this order, two destroyers, one tug and four airplane tenders.

Large Contract In Reconditioning

Todd-Seattle Dry Docks, Inc., are negotiating with the U. S. Navy for the reconditioning and conversion to Navy transports of the former transpacific liners President Grant and President Jackson. These vessels, laid up at Puget Sound for the past several years, were recently purchased by the Navy Department to be used as Navy auxiliaries. The purchase price is reported as $500,000 for both ships. It is estimated that the total cost of reconditioning and conversion will be between $2,500,000 and $3,000,000.

Huge Orders For Bath Iron Works

On June 4 Bath Iron Works, Bath, Me., was awarded a contract to build four single-screw, double reduction geared turbine cargo vessels for the American Export Lines at $2,198,000 per ship. These ships will be 420 feet long, 60 feet beam, and 39 feet 4 inches depth, corresponding to the C-1 Commission type, but will have detail modifications making them similar to the Export class ships.

During June also, Bath received orders from the U. S. Navy to build 8 destroyers. This yard already had under construction six destroyers scheduled for delivery in June, August and December of 1940, and in February, June and August of 1941. It is reported that the Navy has under consideration a plan to limit the Bath Iron Works Yard to destroyer construction and require the American Export Lines ships to be built in another yard.

Federal Yard Launches Another

At 5:30 p.m. Saturday, July 13, the Federal Shipbuilding & Drydock Company launched another cargo vessel at Kearny, New Jersey, for the U. S. Maritime Commission. When completed, this vessel will be allocated to the Lykes Brothers Steamship Company of New Orleans.

She was christened Howell Lykes, in honor of Howell Lykes of Tampa, Florida, one of the brothers of the owning company, and was sponsored by his daughter, Mrs. Chester H. Ferguson. S.S. Howell Lykes is of the C-3 design.

S. S. Deltargentino sliding into the Delaware River at the Sparrows Point Yard of the Shipbuilding Division of the Bethlehem Steel Company, Inc. This fine cargo and passenger vessel is the third sister built by Bethlehem for the Mississippi Shipping Company of New Orleans.

American Shipping Industry

Some Recommendations for the Recovery of Its Heritage, Tradition, Liberty and Success

by Lt. Comm. Edward C. Holden, Jr.

It is noteworthy that during this catastrophic period of industrial revolution, the United States Maritime Commission and all the other maritime departments of the Government have remained steadfast and true to America's traditions, heritages, customs and civil liberties. It is a sad commentary and reflection on the workings of our form of democracy that the same cannot be said of some other departments wherein "soft spots" have weakened our democratic processes.

The lighthouse of progress has been kept burning brightly by the United States Maritime Commission in the launching of its great shipbuilding program, and in the successful reestablishment of a new American Merchant Marine fleet on the various important trade routes of the world. This has encouraged and inspired private industry to do its part toward solving maritime economic problems for the common good.

Training Progress for American Seamen

With the shipbuilding and rehabilitation programs well under way, the United States Maritime Commission, knowing that it was axiomatic that no vessel can be safer than the personnel manning it, and in close working cooperation with the ever-efficient United States Coast Guard, created the United States Maritime Service for the training of unlicensed personnel.

Never before in all American maritime history had there been a well-organized system for the training of seamen in the merchant marine. This endeavor was truly a remarkable step of progress for seamen.

Every American seaman and every American citizen should rise up in whole-hearted support of these notable achievements for the benefit of all seafarers and for the strengthening of our national defense.

A study of the curriculum of the United States Maritime Service training schools reveals a series of scientifically - arranged courses for the advancement of all American seamen.

However, the Fifth Column influence or leadership of certain labor groups demonstrated its gross irresponsibility to the urgent needs of our nation by strongly opposing the establishment and operation of these training schools. Apparently, they didn't believe in permitting American seamen to receive a thorough nautical education. In some instances a virtual boycott was imposed which threatened to deprive American seamen of their inalienable right for proper education and advancement in the merchant marine. This demagogic attitude on the part of certain radical labor leadership was not only a grave injustice to American seamen, but it tended to weaken the second line of our national defense.

American Merchant Marine Naval Reserve

The United States Navy and our national defense system requires the support of a well-organized merchant marine Naval reserve.

Unlike most foreign nations, the personnel of the American Merchant Marine is not required by the Government to qualify in the Naval Reserve. Due to the Fifth Column infiltration of men who would destroy our maritime industry and sea power, this is manifestly a very weak link in the chain of both maritime progress and in our national defense.

It is my solemn belief that the Merchant Marine Naval Reserve should be so constituted as to include every man aboard our merchant vessels. Every one recognizes the vital necessity for us to advance effectively upon the front of national preparedness. To accomplish this worthy purpose we must possess a united front of loyalty.

During the last several years the moral disintegration of man power in the merchant marine has become notorious throughout the world. It has been the subject for discussion among both civic and professional groups in the United States; also in foreign countries.

It is of but little avail to build new, safe vessels if we fail to reestablish law, order, discipline and proper training among the operating personnel. Everyone knows that the failure of man power will jeopardize the safety of any vessel and impair its efficiency in case of national emergency.

Those of us who have followed the sea during the greater part of our lives know that there is no real reason why the United States should not have one of the finest merchant marine fleets in the world, together with the respect and confidence of all peoples.

However, everyone knows that labor conditions in the maritime industry, both afloat and ashore, have been retarding prospects for any constructive action to promote the future welfare of the American Merchant Marine so that people will "ship and travel" on American vessels. Most potential investors believe that these conditions have made the shipping industry a poor risk for capital investment. The normal development of the marine in-

dustry has thereby been retarded, and marine employment reduced to low levels, particularly on the Pacific Coast of the United States.

Recommendations for a Cure

To get this condition improved, and to establish the American maritime industry on a sure foundation, we believe that the following five courses of action should be put in effect as promptly as possible:

(1) All Fifth Column, Trojan Horse or 'Ism influences must be immediately removed from the ranks of government and maritime labor. Certain Government officials (with particular reference to labor administrators) must stop patting the flanks of the Trojan Horse. Every means possible must be taken to protect the great American trade unions from Fifth Column leaders, officers and organizers.

(2) Admission requirements of the United States Maritime Service training schools must be revised in favor of high school boys in order to furnish new man power for the new merchant marine. Thousands of good American boys are clamoring for a chance to follow a sea career, which is denied them at present, due to barriers imposed by Fifth Column labor leaders.

(3) Shipping commissioners and steamboat inspectors should be given authority to pick up the "certificates of competency" of:

(a) All offenders of law, order and discipline.

(b) All physically and mentally afflicted as per the records of the United States Public Health Service, such as chronic venereal cases, epileptics, drug addicts, habitual drunkards and insane.

(4) Encourage with proper membership incentives the development of a strong merchant marine Naval Reserve for officers and unlicensed personnel.

(5) Marine management should organize a "united front" for safety and efficiency in all operations, including better human and industrial relations.

Today, and in the future, no maritime organization can justify its existence unless it is geared up for practical and scientifically-arranged safety and human relations systems.

When workers know that management is interested in their safety and welfare, they invariably respond in a very loyal manner. No subversive influences can take hold when employer interest in workers predominates.

Experience has shown time and time again that when any employer neglects safety programs, trouble starts, coupled with organization demoralization; then the good employers suffer for the acts of others.

United action for safety under expert and experienced guidance will solve most of our problems.

These important defensive measures must be taken at once to protect liberty and democracy in America. We of America must proceed against subversion from within, as well as protect against invasion from without.

We must be inculcated with strong determination and patriotic spirit, so that we shall be united and invincible in case of national emergency.

Vibration-Damping Cable Connectors

Described in a new eight-page bulletin are the improved Electroline-Fiege wire rope connectors with built-in vibration-damping design manufactured by the Electroline Company of Chicago. These connectors develop full line strength, yet grip the cable with "feathered-off" compression which takes up vibratory stresses and prevents crystallization at the point of connection, thus greatly increasing rope life.

Installation methods are described, and the several corrosion-resistant finishes and types, available in various sizes, are listed.

New Extinguisher Wall Bracket

This new wall bracket protects extinguishers from swinging against or scratching walls, and from being knocked off the wall with resulting damage to the extinguisher or discharge of its contents. It is especially practical for mounting in halls or corridors of schools, hospitals, hotels, institutions and public and industrial buildings, where there is heavy traffic.

This bracket, developed by the Pyrene Manufacturing Company, Newark, N. J., has a long steel band at the back extending the length of the extinguisher. It provides two-point suspension. At the top it slides into the standard supporting loop on the extinguisher. At the bottom a semicircular holder fits into and around the apron of the extinguisher to prevent sidesway. The extinguisher is held in a firm position but may be easily and quickly removed for fire emergency by simply raising it two inches. It is known as the B9S school special wall bracket.

Atlas Diesels

(Continued from Page 29)

costs work out to approximately 1½ mills per kilowatt hour.

It is expected that the maintenance costs with heavy fuels will not be appreciably higher than the maintenance costs when conventional Diesel fuel is used. The first engine was run for a considerable period of time on the test block in addition to the endurance run and although period of operation is comparatively short no indications of undue wear have been observed. It is consequently expected that these auxiliary generating set engines will show remarkable overall operating economies and engineers of the Atlas Imperial Diesel Engine Co. and the Maritime Commission will watch their operation with great interest.

Moore - McCormack in New S. F. Offices

On Thursday afternoon, July 24th, the doors of Moore-McCormack Line's superb new offices at the corner of Pine and Battery streets in San Francisco were opened to welcome hundreds of Pacific Coast shipping and traffic men, invited to inspect the new headquarters of their Pacific Coast-South America service.

Present were the "Who's Who" in local traffic circles extending congratulations to hosts Comm. K. H. Donavin, Coast Manager, and other executives of the Moore-Mc-Cormack Line.

The new offices are centrally located and have been designed to take care of the increasing business for which these ship operators are planning under an expansion program which adds four new combination freight and passenger liners next year to a present-day fleet of five vessels . . . and a fleet of eight vessels later in the near future upon delivery of three ships now under construction at the yards of Sun Shipbuilding & Dry Dock Company.

Expressing his gratification over the manner in which Pacific Coast shippers have accepted their new service out of Coast ports, Commander Donavin reports tonnage bookings on an upward curve. The organization, now rated as America's largest ship operating firm, enjoys valuable contacts in the South American districts which have long been regular ports-of-call for their East Coast sailings.

Out from New York headquarters during July came Emmet J. McCormack, vice-president and treasurer of Moore-McCormack Lines, Inc. He, too, was enthusiastic over the company's recognition by Coast shippers and over the future trade developments between Washington, Oregon and California and South America; declaring these trade possibilities are "enormous."

The Pine-Battery offices, on the street level, enjoy good substantial "attention value" and facilities are amply available for freight and passenger requirements.

McCormick's New Skipper is Honored

The S.S. Charles R. McCormick, owned and operated by the McCormick Steamship Company, sailed from New York harbor March 23, bound for Narvik, Norway. When a little over a week out from New York harbor, the captain, Oscar C. Orsland, passed away on March 31. Now in command of the American freighter is William Schutz, a naturalized United States citizen, born in Germany, whose capacity was first officer.

The freighter arrived in Bergen the afternoon of April 8. Early the next morning, the captain and the thirty-two members of his crew were awakened by the sound of firing.

"Most of us growled and kicked at the Norwegians for having target practice so early in the morning. Later we learned the Germans had taken the port. A German destroyer came into the harbor and docked ahead of the freighter. By evening twenty or thirty German warships had entered the port. One of them, a cruiser, the Bremse, made fast to the starboard side of the Chas. R. McCormick."

Shortly after this the allies raided the harbor from the air. Anti-aircraft guns fired at the planes from all the German ships. One plane, seeing the Bremse, headed toward the American ship, but turned away when it saw the vessel's American flags.

At 7 o'clock the next morning, there was a more severe raid. Again anti-aircraft guns went off all over the harbor. Again a raiding plane made for the Bremse. The Bremse fired at it. Her shells and bullets, arching diagonally over the freighter, shot away part of the vessel's after rigging.

None of the American seamen was injured, but they breathed a sigh of relief when they started off for a safer place three hours later.

They went thirty miles north to Stammes. They had been there three weeks when on May 5 two German torpedo boats entered the harbor and placed a German commander on board. The commander—crew members said his name was Heersh—made them take the ship back to Vaksdal the next day, with him on the bridge.

They remained there until May 21, when they were taken back to Bergen. Four German minesweepers escorted them on the way. In Bergen the Germans, using Norwegian labor, unloaded the ship and confiscated her 5,000 tons of general cargo.

Captain Shutz and members of the crew were unanimous in praising the way the Germans treated them. The sailors on the Bremse, they said, were particularly friendly, for they were anxious to trade some of their Turkish cigarets for the American brands.

The S.S. Charles R. McCormick arrived in San Francisco harbor July 21. Captain Shutz was given a tremendous ovation at a Rotary Club luncheon and was presented with a gold watch by the company's president, George Pope, Jr., in behalf of the directors of the company.

Launching

The following announcement has been received from A.P.L. headquarters:

American President Lines, Ltd., is proud to announce the launching of the S.S. President Monroe, second of seven new C-3-P vessels being built by the U. S. Maritime Commission for American President Lines round-world service, Wednesday, August 7, 1940, at the Newport News Shipbuilding and Dry Dock Company, Newport News, Virginia. Sponsor, Mrs. Thomas G. Corcoran.

Left to Right: George Pope Jr., President of the McCormick Steamship Company; Capt. William Shutz and other directors of the company—Ira Lillick, Joseph A. Lunny, Talbot C. Walker, Alexander Baldwin, Kenneth Pope.

Bilge Club Holds Annual Tournament

The Bilge Club, Los Angeles Harbor shipping fraternity, assembled over 350 strong with its guests at the Palos Verdes Golf Club on Saturday, June 29, for their Eleventh Annual Barbecue and Tournament.

Golfers teed off commencing at 9:30 a. m., followed by the baseball game between those traditional enemies, the Gulls and the Pelicans The latter event, won by Ed Kellenberger's Pelicans to the tune of 9 to 6, proved to be the hit of the day, with Mike Frankovich, well-known Wrigley Field announcer, as umpire.

Horseshoes, tennis and a tug of war served to keep the Bilgers amused for the balance of the afternoon. Grover Cable won the tennis singles with Ed Marshall and George Loughlin taking the doubles. Capt. Jack Lindermuth's "Black Gang" defeated Capt. Tom Cook's "Deck Gang" in the tug-of-war. T. W. McDonald topped the field in the horseshoe contest. "Billy" Wickersham, one of the founders and the honorary general chairman of the barbecue, took high honors in the perpetual Bethlehem Trophy for golf. "Billy" shot an 87, which, with his handicap of 20, gave him a net 67. George Messail with a 76 took low gross honors for members of the club and also low net. According to the club rules no member can win the award more than once, and Messail was a winner two years ago

Following the sporting events the Bilgers proceeded to the barbecue area where they enjoyed a sumptuous repast which had been prepared under the supervision of Past President Dan Dobler.

After a word of greeting by that grand old Bilger, "Billy" Wickersham, President Lloyd J. Moore made an address of welcome to the Bilgers and their guests. President Moore then turned over the meeting to Bilger "Nip" McHose who acted as master of ceremonies for the awarding of some 96 prizes These prizes had been donated by various harbor firms for the winners in the

Henry Epstein, Leon Brown, Tom Forster, Arthur Woll.

Eloij Amar, Jack Malseed, George Bankson, Larry Hall, Charles Houghton. Center is Ed Hannay.

Left to Right: Terry Hickman, Johnny Wehrman, J. Wingo, Bill Wickersham.

Don Montague, Jim Craig. John McHose, George Bankson.

John Shrewsbury, John Eidom, Bill MacAdams, Stan Clitero, Hal Leedy.

various events. An unexpected award was made to "Billy" Wickersham in commemoration of his past performances.

President Moore announced that this year's barbecue and tournament had surpassed all the previous ones in both attendance and enthusiasm for which he thanked the chairmen of the various committees as well as their members.

W. A. MASON, Publicity.

Nordberg Appointment

Clinton E. Stryker has been appointed vice president and assistant to the president of the Nordberg Manufacturing Company of Milwaukee, Wisconsin, manufacturers of diesel engines, uniflow engines, mine hoists, compressors, Symons cone crushers and screens and other heavy machinery, as well as railway track machines.

Mr. Stryker was a partner in McKinsey, Kearney & Company, Management Engineers, of Chicago, having been with that firm for five years. Prior to that he was with with Fansteel Metallurgical Corporation for a number of years in various administrative capacities. He graduated from the Armour Institute of Technology in 1917 and is a Fellow of the American Institute of Electrical Engineers and a member of the Society of Automotive Engineers.

CLINTON E. STRYKER

Propellers All!

A UNIQUE GATHERING—

The Propeller Club, Port of New Orleans, La., was organized in that city on May 4, 1927, and together with the Propeller Club of New York and the Propeller Club of Boston formed the Propeller Club of the United States on November 9, 1927.

On June 10, 1940, a reception and dinner was tendered in the Hawaiian Room of the Hotel Roosevelt in New Orleans by E. A. Jimison, President of the Propeller Club, Port of New Orleans, to Honorary President and Mrs. Arthur M. Tode of the Propeller Club of the United States. There gathered the officers and wives of this Port, including every past president of the Propeller Club, Port of New Orleans, since its organizing with the exception of the late Cecil N. Bean, who served the club as President from 1928 to 1932.

Front Row (left to right): Henry C. Dreyfus, Vice-President, P. C., Port of New Orleans, 1940-1941; E. A. Jimison, President, P. C., Port of New Orleans, 1940-1941; Arthur M. Tode, Honorary President, Propeller Club of the United States, and National President, Propeller Club of the U. S., 1931-1935; L. B. Pate, Past President, P. C., Port of New Orleans, 1937-1939, National Vice-President, Propeller Club of the U. S., 1939-1940, and Vice-Chairman, American Merchant Marine Conference, 1939-1940; Harry W. Parsons, Past National President, Propeller Club of the U. S., 1927-1931.

Rear Row (left to right): H. R. Iley, Secretary, P. C., Port of New Orleans, 1929-1941; Frank W. Leahy, Past National Vice-President, Propeller Club of the U. S., 1936-1937; D. J. Devlin, Past President, P. C., Port of New Orleans, 1933-1934; Frank E. Ames, Past President, P. C., Port of New Orleans, 1934-1936; Ralph P. Nolan, Past President, P. C., Port of New Orleans, 1936-1937; Joseph M. Rault, Past President, P. C., Port of New Orleans, 1932-1933; A. K. Miller, Past President, P. C., Port of New Orleans, 1927-1928.

Port of Los Angeles

At the Annual Meeting and Election of Officers of The Propeller Club of the United States, Port of Los Angeles No. 66, held at the California Yacht Club, Wilmington, at noon on Wednesday, June 26, 1940, Ralph J. Chandler, Southern California Manager of the Matson Navigation Company, was re-elected President.

Re-elected with Mr. Chandler were Fred A. Hooper, District Manager of the American-Hawaiian Steamship Company, to serve as First Vice-President, and Edgar M. Wilson, General Agent of the American President Lines, Ltd., to serve as Second Vice-President.

Harry Summers, Principal Surveyor of the American Bureau of Shipping, San Pedro, was elected Third Vice-President, to take the place of Morgan Huntoon, local Manager for Calmar Line, who resigned. Mr. Summers also becomes a member of the Board of Governors.

The Board of Governors include the following whose term expires June, 1941:

Jas. L. Adams, Lillick, Geary, McHose & Adams.

J. B. Banning, Jr., General Superintendent, Matson Navigation Co.

Capt. Robert Henderson, U.S.N., Ret., member of the Board of Governors of Calif. Maritime Training Academy (Vice Capt. C. C. Spicer, resigned).

J. L. Hook, Jr., District Manager, McCormick S.S. Co.

Eugene A. Mills, President, Crescent Wharf and Warehouse.

Capt. Benjamin Perlman, U.S.N., director, U. S. Naval Reserve, Eleventh District (Vice-Capt. Claude B. Mayo, U.S.N., Ret., resigned).

Whose term expires June, 1942:

Ralph J. Chandler, Southern California Manager, Matson Navigation Co.

Fred A. Hooper, District Manager, American-Hawaiian S.S. Co.

Capt. C. S. McDowell, U.S.N., Ret., Shipbuilding Consultant, Consolidated Steel Corp.

Francis J. McGowen, President, Waterfront Employers Assn. (Vice Frederic Pique, resigned).

Harry J. Summers, Principal Surveyor, American Bureau of Shipping.

Edgar M. Wilson, General Agent, American President Lines, Ltd.

Whose term expires June, 1943 (elected at meeting June 26, 1940):

J. Disbrow Baker, General Freight Agent, Panama Pacific Line.

Capt. H. H. Birkholm, Vice-President, General S.S. Corp.

Guy E. Buck, Manager, Grace Line.

Thos. B. Forster, General Superintendent, Bethlehem Steel Corp., Shipbuilding Division.

Lloyd R. Richards, Manager, Sudden & Christenson.

Harold C. Smith, Vice-President, Williams, Dimond & Co.

Capt. Benjamin Perlman, U.S.N., welcomed as newest member of our Port, is the newly appointed Director of the United States Naval Reserve, Eleventh District, taking the place of Capt. Claude B. Mayo, U.S.N., Ret., who will become Superintendent of the California Maritime Training Academy.

The membership ratified two amendments to the by-laws of this Port, viz., one consolidating in one committee to be known as the Committee on Membership and Admissions, the duties of the Committee on Membership and the Committee on Admissions; and the other, permitting transfer of membership from another Port, duly recognized by The Propeller Club of the United States, to this Port without payment of another initiation fee or additional dues for the balance of the fiscal year in which such transfer is made.

DAVID LIVINGSTONE,
Secretary.

Port of San Francisco Holds Two Impressive Programs

Propeller Club members of the Port of San Francisco enjoyed two inspiring programs during the month of July setting new "all-time highs" for attendance despite vacation time.

On July 15 Daniel S. Ring, Director of Maritime Personnel for the U. S. Maritime Commission, addressed a fine turn-out in the Concert Room of the Palace Hotel—speaking in an absorbing manner on a subject pertinent to all in attendance.

Speaker Ring sounded an encouraging note when outlining the greatly improved conditions which have been instituted in personnel dealings, and bespoke for the Commission the continued cooperation of shipowners.

On July 23rd Capt. William Shutz, master of the S.S. Charles R. McCormick, appeared as featured speaker at a special program planned to commemorate his courageous experience when his command was an interned eye-witness of Germany's invasion of Norway.

(A further account of Capt. Shutz' exciting adventure is chronicled on an adjoining page.)

Propeller members are now anticipating the launching of the Club's second year. Rounding out a highly successful first twelve-months new administration officers are soon to be elected for carrying the Port of San Francisco destinies to still higher standards.

Hugh Gallagher, chairman; Fred L. Doelker and John T. Greaney comprised the nominating committee as appointed by the Board of Governors and the following report of their findings has been filed with Secretary Eugene F. Hoffman:

President, Charles L. Wheeler; first vice president, J. E. Cushing; second vice president, A. B. Poole, third vice president, Hugh Gallagher; secretary-treasurer, Eugene F. Hoffman; one-year governors, J. E. Cushing, Fred L. Doelker, Roger Lapham, Ira Lillick, A. S. Gunn; two-year governors, F. A. Bailey, E. H. Harms, A. B. Poole, Chas. L. Wheeler, Marshall Levis; three-year governors, Henry Blackstone, Hugh Gallagher, Capt. Lewis Mesherry, Jos. A. Moore, Sr., George Jordan.

Appointment

DeBothezat Ventilating Equipment Division of American Machine and Metals, Inc., has announced the appointment of *Walter C. Davis* to cover the Maryland and District of Columbia territory, with headquarters at Baltimore. Mr. Davis, a graduate of the University of Tennessee School of Chemical Engineering, was formerly associated with DuPont and the General Chemical Company.

Sperry's New Offices at San Francisco

To adequately handle the rapidly increasing installations of Sperry equipment in vessels of the navy and the merchant marine, and in Airplanes of the Military and Transport Services in his district, J. F. McConkey, District Manager for the Sperry Gyroscope Co., Inc., is now occupying enlarged and improved quarters in San Francisco.

The pictures on this page illustrate these quarters and the Sperry Staff for the Northern California district. Top row, left, shows the service Engineers at work in their new maintenance shop. Top row, right, shows the Sperry Instrument School. Center, the main doorway and the staff, left to right Edward Gray, J. F. McConkey, Donna Douglas, Glen Marsh, and George Van Shaick. Bottom row, the manager's office at left, and the building front at right.


EMERALD
Brushes
Backed by the dependable Fuller name—a complete line of brushes meeting the needs of professional painters and the special requirements of industry.
FULLER PAINTS
they last

All-Welded Diesel Drive Auto Ferry

The Ingalls Shipbuilding Corporation has recently completed at its Decatur, Alabama, yard an all-welded diesel automobile and passenger ferry for the Police Jury, Parish of Plaquemines, Louisiana.

This modern little boat, the Pointe-A-La-Hache, is far more elaborate and complete than is usually encountered for short-run ferry service throughout the South.

The principal characteristics are as follows:

Length, molded ......105 ft. 0 in.
Breadth, molded .... 35 ft. 0 in.
Depth, molded .... 5 ft. 0 in.
Displacement at full load, short tons ...250

The entire hull and superstructure is of all-welded steel construction and the hull is divided by five watertight transverse bulkheads into six separate compartments and is constructed with a molded bow and a scow stern, equipped with skeg.

Space for a load of approximately 22 automobiles is provided on the main deck, and in the deck house comfortable cabins for both white and colored passengers are provided, fitted with benches and toilet facilities. Cabins and pilot house are completely insulated and sheathed to provide maximum comfort during the hot weather encountered in the South.

The main engine is a National Superior, Model JM-8, 9 by 12 inches, 8-cylinder, direct-reversible, 4-cycle diesel engine, developing 250 shp at 300 rpm. Auxiliary power is generated by a 15-kw Model GA2 National Superior Diesel auxiliary set.

Among items of equipment and machinery installed appear the following:

Goulds—Sanitary and fuel transfer pumps;
Viking—Bilge and fire pumps;
Doran Cunningham — Triplex air whistle;
Ritchie—8-inch Ritchie compass;
Columbian Bronze propeller;
Edison—90-cell, Model A5H storage battery;
Lane—Metal lifeboats; and
Maxim—Exhaust silencer.

Of particular interest is the Guthan automatic stern tube lubricating system, which has proved especially successful in eliminating stern bearing wear on boats operating in muddy or sandy water where the replacement resultant from such wear is a large item of maintenance cost.

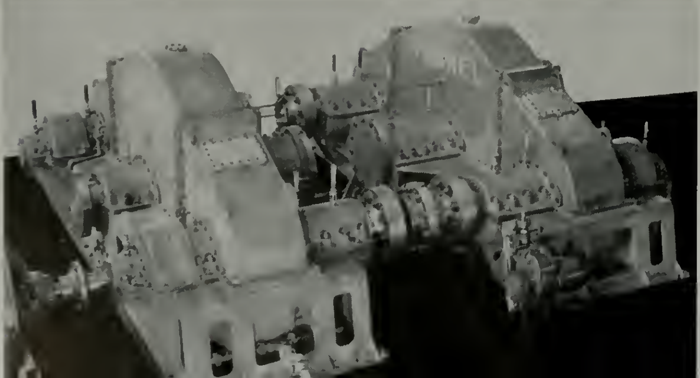
In accordance with the rules of the Department of Commerce, Bureau of Marine Inspection and Navigation, complete fire protection is provided throughout the boat, consisting of hand extinguishers, fire hose and automatic sprinkler system.

The Mechanical Equipment Corporation, New Orleans, Louisiana, furnished all items of machinery. All electrical equipment was installed by the Knight Electric Company, Birmingham, Alabama, using a switchboard manufactured by the Powerlite Switchboard Company, Cleveland, Ohio.

After very successful trials, on which the highlights were excellent maneuvering characteristics, excess of expected speed and lack of vibration, the Pointe-a-la-Hache set out on its long trip down the Tennessee, Ohio and Mississippi Rivers for delivery to its owners in Louisiana.

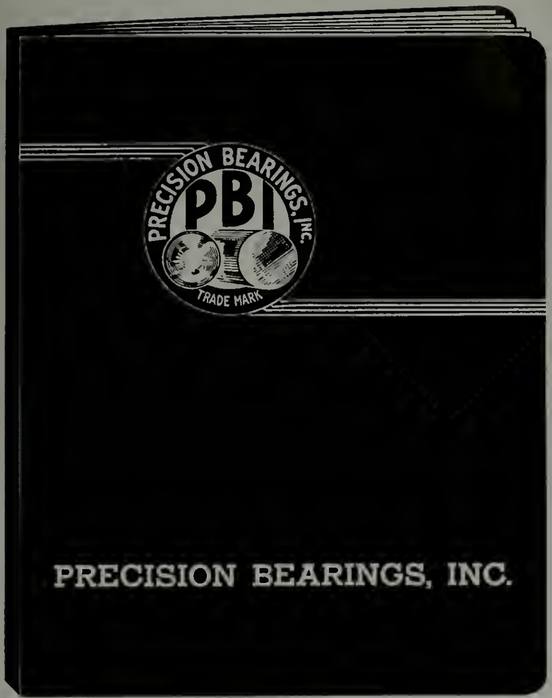
Novel Test for C-1 Propulsion Gears

Few manufacturing plants have facilities on a test block for absorbing over 4000 shaft horsepower at 90 rpm, which was the problem recently faced by the engineers of Farrel-Birmingham Company, Inc., Buffalo, N. Y. Although marine reduction gear drives of this size for use with diesel engines have seldom before been factory tested prior to shipment, Farrel officials insisted upon a week's trial for each at full rated load before five main propulsion gear sets of 4150 shp were delivered to the U. S. Maritime Commission C-1 ships now building at the Western Pipe & Steel Company at San Francisco. The ingenious method of applying this load to conduct the tests is of unusual interest.



As the accompanying illustration indicates, the gear units were tested

(Page 62, please)



Marine Engineers are welcome to a copy.

Bearing Data

Precision Bearings, Inc., announce to the Marine Engineering trade for the use of mechanical engineers a very attractive P.B.I. Engineering Binder covering over 6,000 sizes, 500 types of anti-friction bearings of the ball, roller and thrust series. Included in this are dimensional load and engineering data of the well known lines of which Precision Bearings, Inc., are exclusive factory representatives, Precision Ahlberg Ground Bearings, Aetna C. J. B. Ball Bearings and C. J. B. Pillow Blocks, Bower Roller Bearings and Kilian, Norma-Hoffmann, Rollway and Strom Steel Balls, Precision Croft Bearing Washing and Lubrication Equipment, as well as their own products.

This data is particularly useful to marine engineers. Precision Bearings, Inc., will be very glad, without any charge, to furnish these Engineering Binders to engineers interested in this type of information.

Babcock & Wilcox Exhibit

Modern practice in steam-generating equipment for land and marine use is featured in the exhibit of the Babcock & Wilcox Company at the New York World's Fair. Boiler units for central station and industrial power are represented by a large-scale Scene-in-Action of a B&W Open-Pass boiler that alternately is shown in outline in the boiler house and, in section, under operation; a model of the Integral-Furnace boiler, and a series of views exemplifying the wide range of application of the latter unit.

The marine display includes a sectionalized model of the Divided-Furnace Express boiler, a replica of the United States liner "Amerca" with hull cut away to expose the the two boiler rooms, and a mechanized unit in which a succession of models of B&W-equipped ships of various types, in all kinds of service, pass before the visitor.

A series of moving panels show samples of the company's refractory products, in conjunction with views of the type of power plant or industry to which each is especially applicable. The physical properties of firebrick hard enough to scratch glass, and insulating firebrick light enough to float in water, are demonstrated.

Other exhibits deal with the manufacture of steel and alloy seamless tubular products and the fusion welding of pressure vessels.

Lebor Joins York

John F. Lebor, recently with the RKO Corporation, has been appointed assistant to the executive vice-president of the York Ice Machinery Corporation, according to an announcement by E. A. Kleinschmidt, executive vice-president.

Mr. Lebor was born in Portland. Ore., in 1906, graduated from the University of Oregon in 1928 with honors and a B.B.A. degree, and obtained his master's degree from Harvard University in 1930. During his college career he became a member of the following honorary and social fraternities: Phi Beta Kappa, Beta Gamma Sigma, Alpha Kappa Psi, and Beta Alpha Psi.

In 1930 he entered the training course of the Equitable Trust Company of New York (now the Chase National Bank) and the same year became security analyst in the firm of Scudder, Stevens & Clark. In 1933 he joined the Radio-Keith Orpheum Corporation where he served as funded debt administrator and handled miscellaneous corporate and financial assignments until his present appointment as assistant to the vice-president of the York Ice Machinery Corporation.

Pumping Equipment on Survey Steamer Explorer

Warren Steam Pump Company is justly proud of the choice of Warren pumps for practically all of the principal services on board the U. S. Coast and Geodetic Survey's latest vessel, the Explorer. On this vessel, every effort was made by the Survey to have the most modern and most efficient equipment.

It is therefore significant that the name Warren appears on 17 pumps on Explorer.

Novel Test for Propulsion Gears

(Continued from page 60)

in pairs and the load was applied as follows: The far pinions were connected by a short length of high tensile strength steel shaft capable of torsional distortion without breaking or losing its elasticity. Two halves of a rigid coupling fitted with large hexagonal sections were bolted to the near pinion shafts. After computing gear tooth pressure under full load conditions, this pressure was transmitted to the gear teeth by holding one-half of the coupling stationary and turning the other half by means of a large wrench correctly weight-loaded. When the desired tooth pressure was attained, the two halves of the coupling were bolted together and full load conditions then maintained within the two gear cases. The electric motor at the lower left hand corner of the picture maintained operating speed of the units once they were in rotation. Although full power of over 4000 shp was not actually transmitted by the gears, an equivalent load in the form of gear tooth pressure simulated actual service operating conditions, and assured the builders that each unit was completely satisfactory for shipment and installation.

In service, each pinion will be connected to a 7-cylinder, 2-cycle, Busch-Sulzer diesel rated at 2160 .bhp at 233 rpm for normal continuous duty, and will transmit this power through the bull gear to a single propeller at 90 rpm. Elliott electro-magnetic couplings will be installed between engines and pinion shafts to absorb torsional vibration and protect the engines against possible shock from propeller fouling or striking an obstruction. The electric coupling is carried on its own shaft, which passes through the pinion and revolves in its own bearings. The pinion also revolves in its own individual bearings, and is connected to the coupling drive shaft through the medium of a flexible coupling. This arrangement permits the pinion to align itself without interference from the weight load of the coupling.

The Farrel gear units measure approximately 20 feet overall athwartship, and, so far as is known, these tests are the most ambitious ever successfully completed by any gear manufacturer.

Insulating America

On a large passenger steamship, the insulation of steam lines is a very important item, not only to the saving of heat units for a more economical power plant, but also to the comfort of passengers and crew. For this purpose, on the America, thousands of feet of Keasbey and Mattison "Featherweight" 85 per cent magnesium was employed in both pipe and block form.

Panels for mounting the electrical control equipment on this vessel were made of K. & M. Ebonized Asbestos; and doors, where required, were rendered fireproof by the use of K. & M. 1/16" Gray Sheet Flextos, veneered with various hardwoods.

Building in American Yards

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Hulls Nos. 5360-5364, five C-1 cargo vessels for U. S. Maritime Commission, 395' x 60' x 37'6": 6400 gross tons each; 4000 H.P. Full scantling steam propulsion type. Keel for second ship laid March 4, 1940. **First ship launching date August 6, 1940.**

DRYDOCK AND ROUTINE REPAIRS:

S. O. Barge No. 93, President Lincoln, J. A. Moffett, Maya, Polarine, Aztec, U.S.S. Saratoga, President Taft, Toltec, U.S.S. Maryland, Marymar, U.S.C.G. Relief Lightship No. 76, Texada, R. J. Hanna, H. M. Storey, Kekoskee, A. M. Baxter.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One 20' x 60' steel gasoline barge for U. S. Engineers, Bonneville, Ore. **Completed July 10, 1940.**

DRYDOCK AND ROUTINE REPAIRS:

U.S.C.G.C. Triumph, Jane Christenson, Siranger.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. Keel laying dates June 3, June 17, December 9, 1940, and March 5, 1941; launching dates November 25, 1940, and February 19, April 28 and July 24, 1941; delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 55-foot ketch-rig yacht.

DRYDOCK AND ROUTINE REPAIRS:

Fish & Game Comm. Research Vessel N. B. Scofield, L. A. City Fireboat No. 2, Fandango, Sunrise, Gitana, Joyita, Silver King, Hermana, Seyelyn II; 49 smaller yachts and commercial boats.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Schiller Street
Alameda, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Noyo, Tugs Despatch No. 3 and Governor Markham, Ryder Hanify, Admiral Laws, U.S.A.T. Slocum, State Dredger No. 4, Barges Nos. 54 and 62, Lake Miraflores, Admiral Senn, El Capitan, C.G.C. Morris, Santa Fe Barge No. 3, Etolin, Esther Johnson, Standard Oil Barge No. 8, Davenport, Yacht Janidore.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners; length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 H.P.; 10 knots speed; cost $160,000. Delivery date October, 1940.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Canco, Cornelia, Manzinata, Boxer, 14 cannery boats, Alaska Pacific Packing Co. fleet, Norco.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Meizi Maru, Mizuho Maru, Huzi Maru, Manju Maru, Minato Maru, Nohi Maru, Kumi Maru, Taian Maru, Keisho Maru, Koki Maru, Tyoyo Maru Nos. 1, 2, 3, 5, 6 and 7, Hakurei Maru, Bansiu Maru, Toko Maru, Erling Brovig, Thorshovdi, Cabrillo, Sunset Pacific Barge C-1, J. J. Coney, Topila, Solano.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939. Keel laid, No. Y044, April 1, 1940.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

Order received for construction of one submarine tender (AS12), dated June 12, 1940.

Order received for construction of four submarines (SS236-SS239), dated June 28, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Nashville, Chester, Chicago, McFarland, Maury, McCall, Moffett, Balch, Avocet, YO-24, Boggs, Lamberton, Nitro, Neosho, Eagle No. 38, Eagle No. 32, Stingray, Skipjack, Bobolink.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hulls Nos. 195, Sea Arrow, and 196, Sea Star; two cargo vessels for U. S. Maritime Commission; LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6", SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. **No. 195 delivered July 8, 1940;** No. 196 launched December 22, 1939.

Hulls Nos. 197, Sea Panther, and 198, two C-3 vessels for U. S. Maritime Commission LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6". Keel laid, No. 198, June 20, 1940; No. 197 launched June 11, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Willapa, Jane Christenson, Purse Seiners El Commodore and California Star, Lena Luckenbach, Olinda, S.C.T. Dodd, Madoera, Silver Sandal, Hauraki, Lake Frances, Standard No. 1, Chirikof, Norfolk Maru, Heffron, Floridan, St. Mihiel, Arizonan.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Launched May 16, 1940.

Monssen (Destroyer No. DD436). Launched May 16, 1940.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10), seaplane tender; keel laid October 27, 1939.

Biscayne (AVP11), seaplane tender; keel laid October 27, 1939.

Casco (AVP12), seaplane tender; keel laid May 30, 1940.

Mackinac (AVP13), seaplane tender; keel laid May 30, 1940.

SEATTLE-TACOMA SHIPBUILDING CORP.
Foot of Alexander Ave.,
Tacoma, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. **Keel laying dates, March 5,** April 15, **August 26,** September 26, **1940,** and February 26, 1941. **Launching dates, August 1,** September 1, **1940,** and February 1, March 1, July 1, 1941. Delivery dates, January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Tug Tyee, Dredge Dan C. Kingman, Malama, West Ira, Honomu, Camden, Crown City, Oduna, Romulus, Panama Express.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 141, Western Pacific, bait boat for tuna fishing for Western Pacific Co., San Diego, Calif.: 100' x 26'; 350-H.P. Superior engine. **Delivery date, July 1, 1940.**

Hull No. 142, St. Francis, purse seine fishing boat for Hubert Ursich, Tacoma, Wash.; 93' x 24'; 380-H.P. Enterprise engine. **Delivery date, July 1, 1940.**

Hull No. 143, purse seine fishing boat for Spiro Babich, Gig Harbor, Wash.; 95' x 25'; 400-H.P. Atlas engine. Launching date, June 1, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Tug Madrona, Tacoma Fireboat, Fishing Boats Helen L. Christine, Western Chief, Progress, Western Flyer and New Mexico.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. **Keel laying dates,** February 5, February 19, **August 15,** November 10, **1940;** and March 1, 1941. **Launching dates, August 8,** October 10, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Six coal barges 175' x 26' x 11' for Carnegie-Illinois Steel Co.

Four sand barges 148' x 36' x 15' 6" for Panama Canal.

Ten coal barges 175' x 26' x 11' for stock.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hull No. 178, DD424, Niblack, 1620-ton destroyer for U. S. Navy. **Delivery date August, 1940.**

Hulls Nos. 180-181, DD429, Livermore, and DD430, Eberle, two 1620 ton destroyers for U. S. Navy. Delivery dates, December, 1940, and February, 1941, respectively.

Hulls Nos. 182-183, DD437, Woolsey, and DD438, Ludlow, two 1620-ton destroyers for U. S. Navy. Delivery dates, June 15, 1941, and August 15, 1941.

Hulls Nos. 184-187, four cargo ships for American Export Line; 400' x 60' x 39'.

Hulls Nos. 188-189, DD457 and DD458, two destroyers for U. S. Navy.

Hulls Nos. 190-195, DD449-451, 467-469, six destroyers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy. Launched November 15, 1939, and March 26, 1940.

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S Navy. Keels laid March 27 and May 15, 1940.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450' B.P. x 66' x 42' 3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons. No. 1481 launched June 22, 1940.

Hulls Nos. 1485-1487, three tankers 502' x 68' x 37'; 21,000 tons.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co.; 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co.; 15,450 tons dwt.

Hulls Nos. 1494-1497, four heavy cruisers for U. S. Navy.

Hulls Nos. 1498-1501, four light cruisers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hull No. 4331, Esso Albany; 16,300 dwt. ton tanker for Standard Oil Co. of N. J.; 18 knots speed. Launching date April 27, 1940.

Hulls No. 4338, Delorleans; and No. 4339, Deltargentino; two passenger and cargo ships for Mississippi Shipping Co. **Launching dates,** No. 4338, February 17, 1940; **No. 4339, July 13, 1940.** Delivery dates, No. 4338, September 1, 1940; No. 4339, December 1, 1940.

Hulls Nos. 4341-4343, three cargo vessels for Seas Shipping Co.

Hulls Nos. 4344, James Lykes, 4345-4348, five C-1 cargo vessels. No. 4344 launched July 27, 1940.

Hull No. 4349, Esso Nashville, tanker for Standard Oil Co. of N. J. 13,000 tons dwt.; 13 knots. Launched June 15, 1940.

Hulls Nos. 4350-4352, three cargo vessels for Seas Shipping Co.; 450' x 66' x 34'; 6300 H.P.; 8500 gross tons.

Hulls Nos. 4353-4356, four oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9,800 gross tons.

Hull No. 4357, oil tanker for Union Oil Co. of Calif.; 442' x 63' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4358-4359, two oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9800 gross tons.

Hulls Nos. 4360-4361, two oil tankers for Union Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4362-4364, three cargo and passenger vessels for Mississippi Shipping Co.; 465' x 65'6" x 39'9"; 8600 H.P.; 8300 gross tons.

Hull No. 4365, oil tanker for Richfield Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4366-4368, three oil tankers for Panama Transport Co.; 487'6" x 68' x 37'; 7000 H.P.; 9800 gross tons.

Hull No. 4369, oil tanker for Continental Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417' 9", breadth 60' 0", depth 37' 5". Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

Hulls Nos. 8021-8022, two destroyers for U. S. Navy.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P. 714' 0", beam to outside armor 108' 0", std. displ. 35,000 tons; geared turbine engines; express type boilers. Launched June 13, 1940; contract delivery, September 1, 1941; estimated delivery date, October 15, 1941.

BB 61, Iowa, battleship; LOA 880', beam 108'; 4500 tons standard displacement; geared turbines. Keel laid June 27, 1940. Contract delivery date August 1, 1943.

BB 62, Missouri. Order placed June 12, 1940.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

Two steel tugs 90' x 23' x 10'; Fairbanks Morse 805 H.P. engines; for builder's account. **Delivery dates August** and September, **1940.**

One wooden deck scow 118' x 36' x 10' for A. J. Harper, Baltimore, Md. **Delivery date July 31, 1940.**

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170'. **Delivery date, August, 1940.**

Hull No. 167, **sub-chaser PC-452**, length 174', for U. S. Navy. Keel laid March 14, 1940.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1656, one welded steel carfloat 330' x 40' x 11' for Long Island RR, Philadelphia, Pa.; 1303 gross tons.

Hull No. 1659, one welded steel oil barge 148' x 38' x 9' for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1674, one 700-H.P. twin screw diesel towboat hull 135' x 26' x 8' for Wheeling Steel Corp., Wheeling, W. Va.; 290 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135' x 27' x 11' 9" for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1690-1691, two welded steel deck lighters 80' x 30' x 9' for Pennsylvania R.R.; 354 gross tons.

Hulls Nos. 1692-1701, ten welded steel car floats 250' x 34' x 9' 1" for Pennsylvania R.R.; 5940 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 943 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135' x 27' x 11' 9" for Semet Solvay Company; 290 gross tons.

Hull No. 1724, welded steel gasoline barge 195' x 35' x 9'6" for Campbell Transportation Co., Pittsburgh, Pa.; 568 gross tons.

Hulls Nos. 1726-1735, ten type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

Hull No. 1736, one welded steel oil fuel storage barge for Brooklyn Edison Co.; 375 gross tons.

Hulls Nos. 1737-1739, three welded steel oil barges, 195' x 35' x 9' 9", for stock; 598 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges 175' x 26' x 10' 8" for stock; 4720 gross tons.

Hull No. 1750, 1300 H.P. twin screw diesel towboat 176' x 36' x 10' for stock; 590 gross tons.

Hull No. 1751, 760 H.P. twin screw diesel towboat 145' x 26' x 8' for stock; 318 gross tons.

Hulls Nos. 1752-1756, five welded steel gasoline barges 195' x 35' x 9'9" for stock; 2990 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; launched January 27, 1940; **delivery date, July 3, 1940.**

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; launched March 27, 1940; delivery date, September, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laid December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons; keel laid February 14, 1940.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons; keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 6, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Launched March 9, 1940.

Hulls Nos. 165, Almeria Lykes; 166 and 167; three C-3 cargo vessels for U. S. Maritime Commission. **Launching** dates, No. 165, April 27, 1940; **No. 166, July 13, 1940.**

Hulls Nos. 168-169, CL51, Atlanta, and CL52, Juneau, two 6000 ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison, and 171, Ericsson, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172-176, five C-1 cargo vessels for U. S. Maritime Commission. Keels laid, No. 172, January 22, 1940; No. 173, May 6, 1940; Nos. 174-175, June 6, 1940.

Hulls Nos. 177, Esso Montpelier; and 178, two tankers for the Standard Oil Co. of N. J. Launched May 25, 1940. **No. 177 delivered July 3, 1940.**

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo ships for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co.; 13,000 dwt. tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co.; 15,000 dwt.

Hulls Nos. 194-197, four destroyers for U. S. Navy.

Hulls Nos. 198-203, six destroyers for U. S. Navy.

Hulls Nos. 204-205, two destroyers for U. S. Navy.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. Delivery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147' x 35' x 7'6". Estimated completion date, September 1, 1940.

One oil barge, 195' x 35' x 9' 9", for C. J. King, Dothan, Ala. **Completion date, July 29, 1940.**

One oil barge, 225' x 35' x 10' 0", for Standard Oil Co. of Kentucky. **Completion date, August 16, 1940.**

One oil tanker for Husky Transit Corp., Minneapolis, Minn.; 235' x 35' x 14'. Estimated completion date January 3, 1941.

One derrick barge for Dunbar & Sullivan Dredging Co., Detroit, Mich.; 100' x 43' x 10'. Estimated completion date November 1, 1940.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406' x 57' x 23.5'. Approximate dates, launching date, September 15, 1940; delivery date, January 4, 1941.

One steel twin screw diesel towboat, 140' x 35' x 8' 6". Delivery date, November, 1940.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

China Arrow, Deer Lodge, West Celeron, West Honaker, U.S.C.G. Tender Beech.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 369, America, twin screw mail, passenger and cargo liner for United States Lines Co.; length 723', beam 92', depth 45'. Launched August 31, 1939: **delivered July 2, 1940.**

Hulls Nos. 371 and 372, two oil tankers for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keel laid, No. 372, February 5, 1940. **No. 371 delivered June 21, 1940.**

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid, No. 380, November 13, 1939; No. 381, December 26, 1939; No. 382, February 5, 1940. Launching date, No. 379, June 7, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. Length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 7,700. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. Length 435', breadth 63', depth 40' 6"; gross tonnage about 8,000. Delivery date August 1, 1941.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

AV4, Curtiss, seaplane tender for U. S. Navy; launched April 20, 1940.

AD15, Prairie, destroyer tender for U. S. Navy. Launched December 9, 1939.

AV5, Albemarle, seaplane tender for U. S. Navy; keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland, and CL56, Columbia, two cruisers for U. S. Navy; order placed March 23, 1940.

CL57 and CL58, two cruisers for U. S. Navy. Order placed June 12, 1940.

U. S. NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Submarines SS201, Triton; SS202, Trout; SS209, Grayling, SS210, Grenadier; SS205, Marlin; SS228, SS229, SS230, SS231, SS232, SS233, SS234, SS235.

DRYDOCK AND ROUTINE REPAIRS:

Barracuda, Bass, Bonita.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp.; 1600 gross tons; 300′ x 65′ x 20′; steam Una-Flow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. **Launching date August 1, 1940;** delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413′ x 60′ x 37′ 6″; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Launching date November 1, 1940; delivery dates January and March, 1941, respectively.

Hulls Nos. 1077 and 1078, two tugs for Donaldson Towing & Lighterage Co.; 205 gross tons; 95′ 6″ x 24′ x 14′ 9″; steam Una-Flow propulsion; 600 H.P.; 13-knots speed; cost $200,000 each. Launching date May 21, 1940; **delivery date July, 1940.**

Hull No. 1079, tug for Long Island R.R. Co.; 105′ x 24′ x 12′ 11″; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. Launching date October 15, 1940; delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206′ x 65′ x 16′; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Launching date December, 1940; delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 192, single screw steam turbine railroad car carrier for Seatrain Lines, Inc. **Delivery date July 10, 1940.**

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date March, 1941.

Hull No. 194, one tanker for Atlantic Refining Co.; 19,400 tons. **Delivery date July 10, 1940.**

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 18,000 dwt. Delivery dates March and June, 1941.

Hull No. 196, one tanker for Sun Oil Co.; 18,000 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

Hull No. 207, tanker for Standard Oil Co. of New Jersey; 18,000 dwt. Delivery date August, 1941.

Hulls Nos. 208-210, three tankers for Standard Oil Co. of N. J.; 16,400 dwt.; steam turbine.

Hull No. 211, tanker for Atlantic Refining Co.; 19,400 tons.

Hull No. 212, tanker for Sun Oil Co.; 18,000 tons.

Hulls Nos. 213-215, three tankers for Standard Oil Co. of N. J.; 18,000 tons; steam turbine.

Hulls Nos. 216-220, five tankers for Standard Oil Co. of N. J.; 18,000 dwt.

Hulls Nos. 221-222, two tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine.

Hulls Nos. 223-225, three 16-knot tankers for The Texas Co.; single screw steam turbine; 13,285 tons dwt.

Hulls Nos. 226-228, three tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine.

Hull No. 229, tanker for Atlantic Refining Co.; 19,400 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 33-36, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons; diesel powered. **Delivery dates, No. 33, July 1, 1940;** No. 34, September 15, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459′ x 63′ x 31′ 6″; 9291 dwt. tons.

Pacific Northwest Notes

In an effort to acquire the last eleven remaining units of the Southern Pacific-Golden Gate Ferry Lines San Francisco Bay ferries, Capt. Alex M. Peabody, head of Puget Sound Navigation Company of Seattle, has submitted bids on all units of this once-large fleet. Steam ferries are: San Mateo, Shasta, City of Sacramento, Calistoga and Napa Valley. Diesel ferries are: the Stockton, Fresno, Redwood Empire, Lake Tahoe, Mendocino and Santa Rosa.

● Another Call for Bids

Northwest steel building yards were notified that bids would be received in Washington, D. C. for a 209.4 x 39 x 23-ft. steel, 2000-hp geared turbine U. S. Coast and Geodetic Survey ship similar to the Explorer, to cost approximately $1,000,000. Bids are requested also on an 88-ft. wooden twin-screw diesel survey ship similar to the recently finished E. Lester Jones. These two ships presumably will be teamed for special survey work.

● Three Big Shipbuilding Announcements for the Northwest

Three shipbuilding announcements have rapidly expanded the shipbuilding picture on Puget Sound during the month of July, and all of them originated within the same organization—the Todd Seattle Drydocks, Inc.—Seattle-Tacoma Shipbuilding Corp. group.

First, late in June, came the announcement that the Tacoma yard would immediately start construction of a third shipway, and that a new outfitting dock would be built not only to permit hull finishing but complete installation of engines and machinery, and enable the plant to deliver the Maritime Commission ships complete from the Tacoma plant.

Secondly came word that the American Mail liners, President Grant and President Jackson, which have been tied up near Bremerton, in Charleston harbor, have been brought to the big Seattle plant of Todd Seattle Drydocks, Inc., by Navy tugs, and will be converted into naval transports at a cost of from $1,000,000 to $1,500,000 per ship, depending on results of a survey now under way. Simultaneously with the announcement of this contract, Todd's have announced through R. J. Lamont, president, that between 700 and 800 men would be added to the Seattle payroll to rush the naval contracts.

The third important bit of news is the announcement by the Seattle-Tacoma Shipbuilding Corp. that the first of five 7500-ton C-1-B type Maritime Commission motorships would be launched Thursday, August 1, at 4:30 p. m., the first of this type of Commission ships to be launched.

Mrs. John Boettiger, daughter of President Roosevelt and wife of the Seattle publisher, will sponsor this vessel.

PACIFIC MARINE REVIEW

SEPTEMBER, 1940

*ide launching of M.S. AMERICAN MANUFACTURER.
irst of five C-1 cargo motorships under construction
t South San Francisco yard of
estern Pipe & Steel Company*

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

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J. S. Hines	B. N. DeRochie	Paul Faulkner	Alexander J. Dickie	F. Dryden Moore
President and Publisher	Assistant Publisher	Advertising Manager	Editor	Assistant Editor

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PACIFIC MARINE REVIEW

SEPTEMBER
1940

Pacific Coast Proves Shipbuilding Ability

Moore Breaks the Ice — Now We Can All Swim

On August 28, at 7:15 p.m., the Moore Dry Dock Company launched the last hull of a program of four C-3 cargo steamers. This launching, the first evening launch at a Pacific Coast shipyard since the first World War, thrilled a large and enthusiastic audience of launching fans.

As is usual at this yard, the launching proceeded with clocklike regularity. She was christened Mormacsun by Miss Carlota Sepulveda Chapman, and the fine hull with her (Moore) eyes at the prow illuminated by searchlight, and with a great burst of flares on her forecastle, slid gently down the ways to rest quietly on the peaceful waters of Oakland's inner harbor.

Of these four vessels one, the Sea Arrow, has been completed and delivered to the U. S. Maritime Commission, which promptly sold her to the U. S. Navy. The Navy returned her to the Moore Dry Dock Company for extensive alterations to make her over for certain naval uses. The other three unfinished vessels have purchased by the Moore-McCormack Steamship Company for operation in their Pacific Republics Line service between Pacific Coast ports and ports of the East Coast of South America. It is significant that the choice of these vessels was made by Moore-McCormack because of the "well-known excellence of the products of the Moore Dry Dock Company."

The second and third hulls of the series were christened Sea Star and Sea Panther, but are being renamed Mormacsea and Mormacstar to suit the Moore-McCormack nomenclature.

The shipbuilding contract was in a very certain sense a pioneering effort for Pacific Coast shipbuilding. At the time of the signing of the contract for the first two ships, January 25, 1939, no large seagoing vessel had been built on the Pacific Coast for some 17 years. During that interval, the technique of steel ship construction had completely changed and marine steam engineering had doubled its pressures and temperatures. There were many experts who foretold the troubles that were lying in wait for the bold Pacific Coast yard that undertook to construct these modern hulls without any experience in the new technique.

However, Mr. Moore and his key executives were quietly studying the practique of East Coast yards and the possibilities of improving thereon with a few Western touches.

The plans were laid for one building way with ample space in welding tables surrounding that way, and ample crane capacity serving the tables and the way. The first keel was laid on March 18, 1939, and that hull was christened Sea Arrow and launched on September 15, 1939, and delivered July 8, 1940. It is very significant that (although the turbines and gear deliveries were delayed and the installation of these items was rushed) this first high-pressure steam job ever installed in this yard performed on her dock, preliminary and official trials practically without a "weep" in any steam joint, and the condenser vacuum was built up and maintained practically without adjustment.

Second keel was laid September 21, 1939, and that hull launched December 22, 1939. Note the increased speed of erection. Time almost cut in half.

Contract for the last two vessels was signed October 23, 1939. Keel for the first hull under this contract was laid February 5, 1940, and she was launched June 11, 1940. Second keel was laid June 20, 1940, and this hull was launched August 28, 1940, just 48 working days after keel laying.

All of the experts qualified to judge are loud in their praise of the splendid workmanship going into the construction of these hulls, and of the care being given to details of hull finish and arrangement of piping, of equipment and of auxiliary machinery.

The second ship of the quartette is now about ready for delivery, and the third and fourth will be delivered early in 1941.

For many years the shipbuilders of the Pacific Coast have labored under the handicap of having

no samples of their ability in the modern shipbuilding or the modern marine engineering arts to which they could direct the attention of prospective customers. The four vessels produced by the Moore Dry Dock Company furnish such samples. Their sturdy construction, fine finish and perfection of detail are equal to those of any vessels built anywhere. The Pacific Coast has again demonstrated that it can build and equip good ships.

National Defense Activities

Large sums from the National Defense appropriations are being spent and are to be expended on the Pacific Coast.

In naval shipbuilding alone, these expenditures already allocated are very impressive and there is much more to follow in the near future.

The ships recently on order by the Navy in Pacific Coast Navy yards and private yards have an aggregate cost of well over $55,000,000.

As we go to press, the three centers of Pacific Coast naval activity are full of excitement over huge expected expenditures of national defense funds.

Seattle reports the allocation of a 177-million-dollar naval shipbuilding program to her yards, said to be mostly destroyers, and to be divided one-third to Navy yards and two-thirds to private yards.

A large waterfront tract on Harbor Island adjacent to Todd's Seattle plant will be utilized, and it is rumored that 60 per cent of the private yard allocation will be built there and the remainder at the Seattle-Tacoma Shipbuilding Corporation plant in Tacoma.

At San Francisco it is definitely announced that 30 destroyers at a total cost of some 270 million dollars will be built at the Union Plant of Bethlehem. The 32 acres adjacent to that plant, and now occupied by the Columbia Steel Co., will be acquired and changed over for shipbuilding purposes. This same acreage was used by Bethlehem for building destroyers during the first World War.

From Los Angeles comes the news that the Navy is negotiating for the use of a large part of Terminal Island for the purpose of enlarging its base there.

The contracts already let, and these allocations, taken together, make a grand total of naval shipbuilding for the Pacific Coast of well over 500 millions of dollars.

Such a program automatically means a lot of auxiliary naval craft to be built in our private shipyards, and a tremendous lot of repair and reconditioning work at these yards. It will mean also some large housing projects undertaken with Federal aid, and a large amount of plant reconditioning for our shipyards.

Some competent authorities aver that there is in these actual and proposed naval expansion activities a potential backlog of orders for the maritime industries of the Pacific Coast closely approximating that now enjoyed by the airplane industry.

Old-Timers Wanted

The United States Civil Service office is searching for men to qualify as:

Principal Naval Architect
Senior Naval Architect
Principal Marine Engineer
Senior Marine Engineer

No competitive examination is required. Experience and general qualifications, based on the applicant's sworn statement and on corroborative evidence, establish the rating of the applicant.

Reasonably good general health, eyesight and hearing are required.

The age limitation reads: "On the date of receipt of application, applicants for these positions must not have reached their seventieth birthday, the retirement age for these positions."

The "Principal" ratings carry a salary of $5,600 a year, the "Senior" ratings $4,600 a year.

Here may be a very good opportunity for many old-timers in marine engineering and naval architecture.

Bids on C-3s

On August 6 two Atlantic Coast shipyards and four Pacific Coast shipyards submitted bids to the U. S. Maritime Commission for the construction of a group of C-3 type cargo vessels. Bids were asked on from one to six steam- or diesel-propelled.

On the basis of six vessels, the bids were, for each ship:

	Fixed Price	*Adj. Price*
Ingalls Shipbuilding Co.		
Steam	$3,225,000	$2,925,000
Western Pipe and Steel		
Steam	$3,240,000	$2,990,000
Diesel	3,640,000	3,390,000
Moore Dry Dock Co.		
Steam	$3,374,500	$3,174,500
Sun S. B. and D. D. Co.		
Steam	$3,402,000	$3,137,000
Diesel	3,618,000	3,337,000

L. A. S. B. and D. D. Co.		
Steam	$3,450,000	$3,150,000
Diesel	3,700,000	3,340,000
Seattle-Tacoma S.B. Corp.		
Steam	$3.526,755	$3.066,744
Diesel	3,958,125	3,498,144

Correcting for the Pacific Coast 6 per cent differential, the Ingalls low bid on six adjusted-price steamers would be $2,925,000 plus 6 per cent, or $3.100,500; so that Western Pipe and Steel Company of San Francisco, with a bid of $2,990,000, is the low bidder on steamers, and Seattle-Tacoma Shipbuilding Corporation is next to lowest with $3,066,744.

Treating the low diesel bid of the Sun Shipbuilding and Dry Dock Company in the same way, we have $3,337,000 plus 6 per cent, equals $3,537,220, which makes Los Angeles Shipbuilding and Dry Dock Company, at $3,340,000, the low bidder on diesel-engined ships, with Western Pipe and Steel, at $3,390,000, next lowest, and Seattle-Tacoma Shipbuilding Corp. third lowest, at $3,498,144.

These bids indicate that under present conditions Pacific Coast shipbuilders can and do compete with the Atlantic Coast. In the matter of delivery dates, the Pacific Coast yards specified times for construction of the six ships ranging from 620 days to 720 days. The times specified by Atlantic Coast yards ranged from 720 to 1205 days.

More Maritime Commission Awards

In another editorial we comment on the "C-3 bids," and draw the conclusion that Pacific Coast yards are showing that they can compete. As we go to press, this is confirmed by the announced awards of contracts arising from these bids.

It will be remembered that bids were requested on from one to six C-3 type cargo vessels, either diesel or steam propulsion. We do not have all the details of the awards made, but it is definitely announced that the U. S. Maritime Commission, after several weeks of negotiations with the shipbuilders, has allocated twelve of these C-3 ships to three shipbuilding firms.

First award gave four vessels to the Western Pipe and Steel Company, to be built in their yard at South San Francisco, California.

Second award was to the Seattle-Tacoma Shipbuilding Corporation for four vessels, to be built in their yard at Tacoma, Washington.

Third award was to the Ingalls Shipbuilding Company, to be built in their yard at Pascagoula. Mississippi.

Very gradually but surely the shipbuilding effort is spreading to benefit all centers of the industry in the United States.

Here is an important group of twelve ships, aggregating in round numbers $36,000,000, and two-thirds of it is coming to Pacific Coast yards, while the other third goes to the Gulf Coast, and none to an Atlantic Coast yard.

The vessels to be built are apparently all steamers. Should the Commission decide to build any of the diesel drive ships contemplated in this bidding, they too on the bids would come to Pacific Coast yards.

Pacific Coast Merchant Shipbuilding

Yard	*Location*	*No. and Type*	*Value*
Bethlehem Union Plant	San Francisco	5 C-1s	$10,010,000
Consolidated Steel Corp.	Los Angeles	4 C-1s	7,560.000
Moore Dry Dock Co.	Oakland	3 C-3s	8,363,760
Seattle-Tacoma S.B. Corp.	Tacoma	5 C-1s	$10,635,000
		4 C-3s	11,960.000
Western Pipe & Steel Co.	San Francisco	5 C-1s	10,635,000
		4 C-3s	11,960,000
Total		35 ships	$71,123,760

MERCHANT SHIPS BUILDING FOR PACIFIC COAST LINES

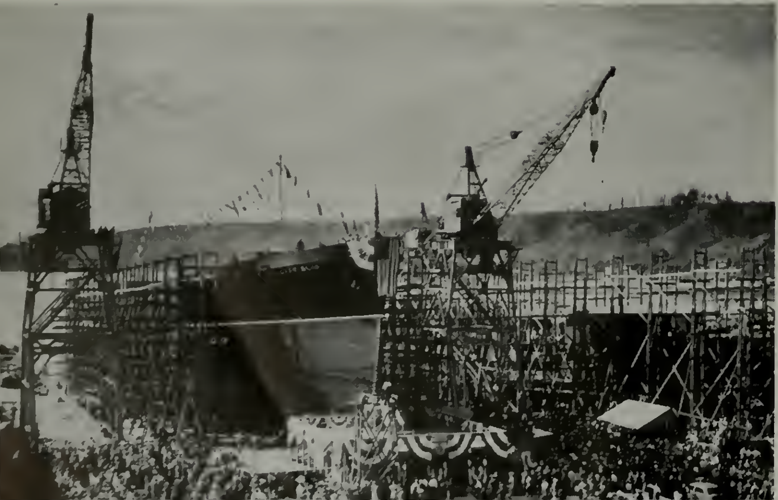
Yard	*Line*	*No. and Type*	*Value*
Newport News	American President	7 C-3 Comb.	$25,410,000
	Matson	2 C-3 Spec., Approx.	5,000,000
Federal	Matson	2 C-3 Spec., Approx.	5,000,000
Sun	Standard Oil of Calif.	1 tanker, Approx.	2,000,000
Bethlehem Sparrows Point	Union Oil	3 tankers. Approx.	6.000.000
Total		15 vessels	$43,410.000
Grand Total, Merchant Ships Building in Pacific Coast Yards or for Pacific Coast Lines		45 ships	$114,533,760

Seattle - Tacoma Shipbuilding Launch First Pacific

(Photos Courtesy Turner Studios, Tacoma)

Above: The sponsor, Anna Roosevelt Boettiger, wife of a Seattle publisher, and daughter of the President of the United States; Mrs. R. J. Lamont, wife of the head of the shipbuilding firm; and Herbert Todd of the Todd Corp., New York.

The men chiefly responsible for shipbuilding at Tacoma. Sitting, left to right: Walter L. Green, vice president and general manager; R. J. Lamont, president; J. A. McEachern, vice president. Standing: R. L. Dalton, secretary and assistant treasurer; O. A. Tucker, assistant general manager; Charles D. Gillet, chief engineer; and George Havas, chief estimator.

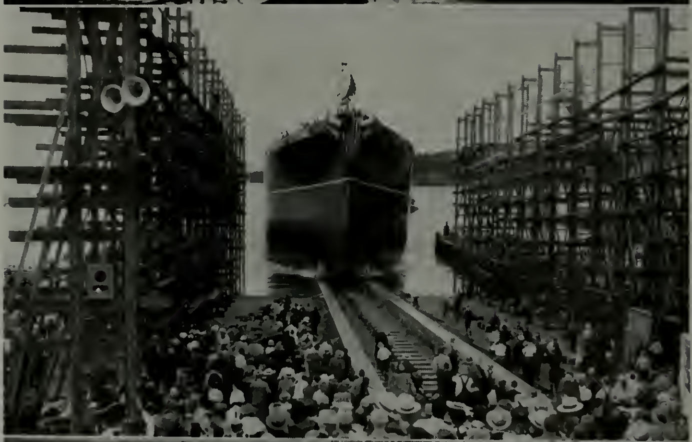


The yard presented a very festive appearance on August 1 a few minutes before the launching as Cape Alva, decorated with flags and bunting, stood poised ready for her dip into the cool waters of Commencement Bay — the first ship to be launched from this site in eighteen years.

Cape Alva is a C-1 motorship of the full scantling type, and will be powered with two 2250-bhp Hamilton diesel engines connected to the propeller through Westinghouse electric couplings and gears.

Corp.
Coast C-1

The stern of Cape Alva five minutes before launching. Note the beautifully-molded lines of this cargo motorship.



Cape Alva taking the water. This sturdy, full-bodied cargo carrier has beautiful underwater lines, and will show a good turn of speed.

Cape Alva safe at the outfitting pier. This pier was completed 24 hours before the launching and is now equipped with a large Whirley crane for handling the big Hamilton diesel engines and other machinery.

Bethlehem Union Plant

The First Seagoing Launched

The Union Plant of Bethlehem is famous for fair-lined hulls. Cape San Martin, shown here ready for launching August 6, is particularly noteworthy in this respect.

"I christen thee Cape San Martin!" Mrs. J. Lewis Luckenbach, wife of the president of the American Bureau of Shipping, and daughter of J. A. McGregor, former general manager of the Union Iron Works, is a gracious sponsor who appreciates all the meaning of a launching.

The Cape San Martin goes to the outfitting dock, where her Bethlehem turbines, Babcock & Wilcox boilers and other machinery will be installed.

Launches C-1

Merchant Vessel in San Francisco in Many Years

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The four pictures herewith show the progress of Cape San Martin at two-month intervals, from keel laying to a point almost ready for launching. Her hull is approximately 60 per cent welded construction.

Much of the welding is done on assembly racks alongside the building slip. Bulkheads and large sections of the inner bottom and stiffening members are thus welded into assembled units, lifted into place in the hull by the cranes, and spot welded in place.

On the second ways alongside, another C-1 is approaching readiness for launching; and on the ways vacated by the Cape San Martin, a new keel was laid shortly after her launching.

The Union Plant has a contract for five of these C-1 cargo steamers and also a contract to build two destroyers for the U. S. Navy. They are now constructing a large shipbuilding way for the naval work.

There is also practical assurance from the U. S. Navy of the allocation of some thirty destroyers to be built by the purchase from Columbia Steel Company of the adjacent 32 acres which was during the first World War the destroyer building plant of the Union Iron Works.

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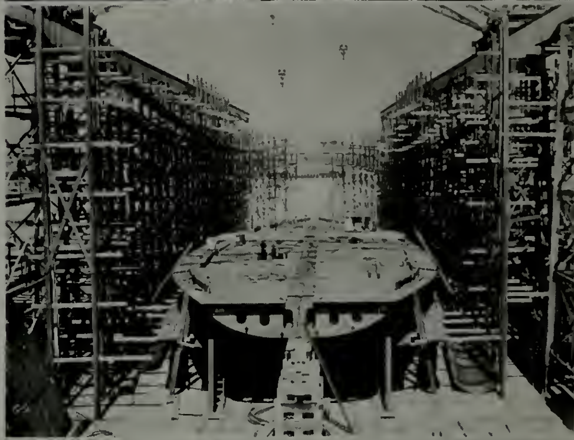
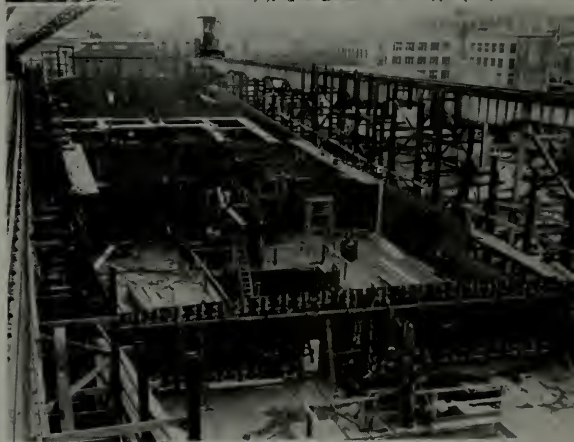
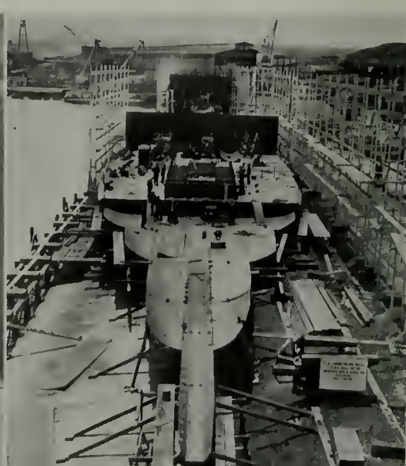




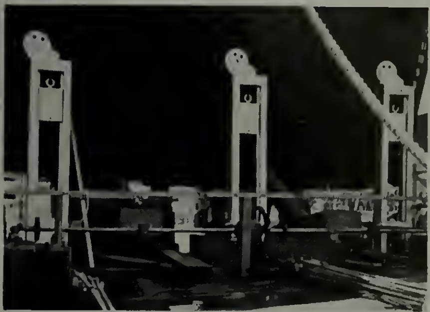
Side Launchings Begin Again at Yard of

Mrs. Kenneth Dawson stands ready to smash the bottle on the ship's nose.

Below on this and the facing page are six views of the American Manufacturer taken at regular intervals and showing the progress of construction from keel laying to within a few weeks of launching.



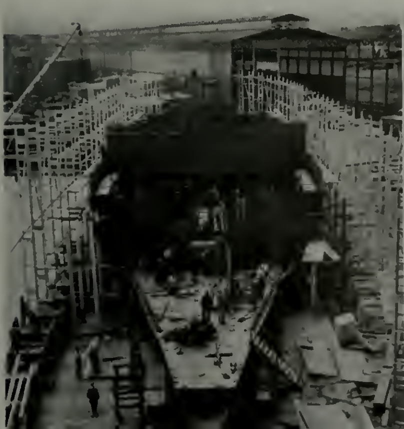
the South San Francisco Western Pipe and Steel Company



AMERICAN
MANUFACTURER

August 8,
1940

Above and from left to right, the four illustrations show bow view of the ship just before launching; the three dog shores at the bow; the three guillotines for cutting the ropes that hold the bow dog shores; and the stern just before launching, showing at lower left the three after dog shores. These dog shores hold the hull on the ways when all the blocking as been cleared away. Releasing the dog shores by cutting the ropes that hold them frees the hull to slide down the ways and plump into the basin with an enormous splash, as shown on next page.
(Photos by Phil Stroupe)



How They Go Over Sidewise

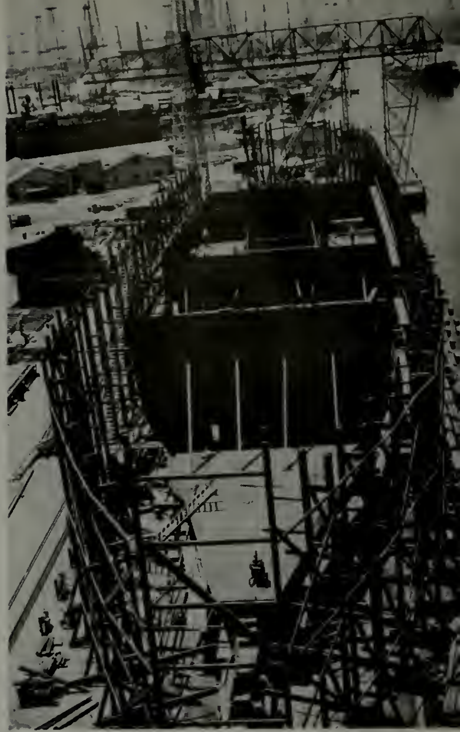
Nose of American Manufacturer drips champagne as she starts.

About two-thirds down the ways.

At end of ways, just starting to tip.

The big splash. This photo enlarged from a candid snap taken by James Swett of Burlingame.

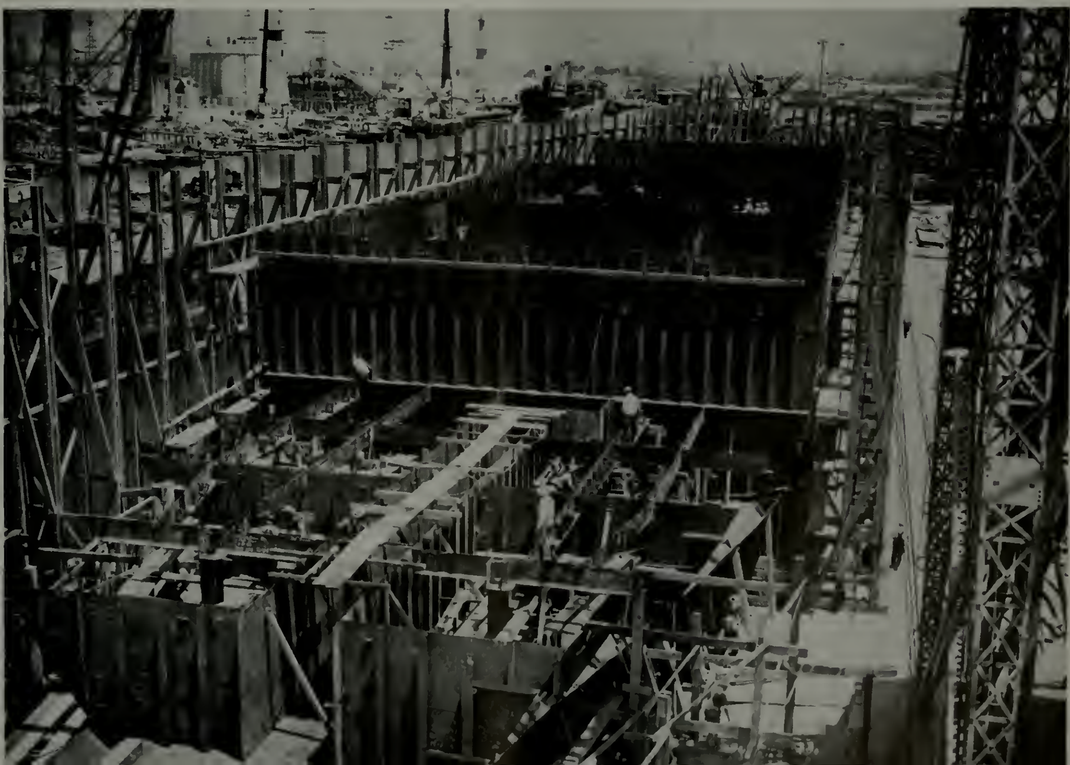
Consolidated Steel Corp. Ltd. Makes Great Progress



Construction on the first of four C-1 cargo vessels to be built for the Maritime Commission by the Consolidated Steel Corporation Ltd. has progressed sufficiently to indicate that the original launching date may be set forward by several weeks, officials announced recently.

The C-1 ships will be the first large craft built in Southern California in twenty years. Undertaken as a part of the Government's pro-

At right and below: Progress views of the first C-1 in the program of four cargo vessels building at Long Beach.



gram to restore the merchant fleet and to provide auxiliary naval vessels in time of war, the four C-1 ships are being constructed at a total cost of $7,560,000.

Actual assembling of the first ship at the Long Beach yard was begun on May 27. Two days later the bottom shell plate was laid. At the same time inter-bottom sections were under way on adjacent assembly tables.

The week following, the keel was laid, and work has progressed steadily until today the hull of the first C-1 is more than one-third completed, according to company officials.

More than 380 men, residents of Long Beach, San Pedro and Los Angeles, are employed in the work. Construction activities are carried on with the men working in three shifts, on a five-day-week basis.

Slightly more than 416 feet in length, the vessel is to have a 60-foot beam. The main propelling machinery will consist of a high-speed, high-pressure, cross compound turbine of the latest marine design, driving a single propeller through double reduction gearing.

The boilers will be fitted for burning oil under forced draft, and will operate at 450 pounds gage pressure with 750 degrees Fahrenheit total temperature at the superheater outlet. The great majority of the auxiliaries are electric motor driven, deriving their power from two steam turbine driven generators.

More than 3000 tons of steel are to be used in the vessel, which, when completed, will have a fully-loaded displacement of 12,500 tons and a speed of fourteen knots. She is to be of the full scantling three-deck type, with accommodations for 12 passengers and quarters for a complement of 47 officers and crew.

Illustrative of the widespread benefits derived from this shipbuilding contract is the following partial list of the firms supplying machinery and equipment:

The boilers will be furnished by the Babcock & Wilcox Company.

Propulsion turbines are by the Westinghouse Electric and Manufacturing Company, who also are supplying the turbo generating sets and many of the motors.

Davis Engineering Company built the evaporators, distillers and other heat-exchanging equipment.

Columbia Steel Company is responsible for the steel castings.

The steering engine is by Lidgerwood Manufacturing Company.

American Hoist & Derrick Company supplies the windlass, the capstans and the cargo winches.

Welin Davit and Boat Company builds the davits and the boats.

Bethlehem Steel Company forges the line shafting that transmits the power of the turbine to the Doran propeller.

How Many, Who, and Where Are Our *Non-Citizen Residents?*

As part of the National Defense program, a nationwide registration of aliens will be conducted from August 27 through December 26, 1940, by the Immigration and Naturalization Service of the Department of Justice. Registration will take place in the post offices of the nation. It is expected that more than three and one-half million aliens will be registered during the four-month period.

Registration is made compulsory by a specific act of Congress, the Alien Registration Act of 1940, which requires all non-citizens to register during the four-month official registration period. The law requires that all aliens 14 years or older are to be registered and fingerprinted. Alien children under 14 years of age will be registered by their parents or guardians. When alien children reach their fourteenth birthday, they will be required to register in person and be fingerprinted.

A fine of $1,000 and imprisonment of six months is prescribed by the Alien Registration Act for failure to register, for refusal to be fingerprinted, or for making registration statements known to be false.

As part of its educational program to acquaint non-citizens with the registration requirements, the Alien Registration Division is distributing more than five million specimen forms listing the questions that will be asked of aliens at registration time. Besides the usual questions for establishing identification, the questionnaire asks the alien to tell how and when he entered the country, the method of transportation he used to get here, the name of the vessel on which he arrived.

He is also asked to state the length of time he has been in this country and the length of time he expects to stay. He must also describe any military or naval service he has had, and list the names of any organizations, clubs or societies in which he participates or holds memberships. In addition, he is required to describe his activities in any organization, and to affirm whether or not the organization furthers the interests or program of a foreign government.

To make their registration easier, aliens are being asked to fill out sample forms, which will be available prior to registration, and take them to post offices, where they will be registered and fingerprinted. Every registered alien will receive by mail a receipt card, which serves as evidence of his registration. Following registration, the Act requires all aliens, as well as parents or guardians of alien children, to report changes of residence address within five days of the change.

The Alien Registration Act was passed so that the United States Government may determine exactly how many aliens there are, who they are, and where they are. Both President Roosevelt and Solicitor General Biddle have pointed out that registration and fingerprinting will not be harm-

ful to law-abiding aliens. The Act provides that all records be kept secret and confidential. They will be available only to persons approved by the Attorney General of the United States.

Fingerprinting of aliens carries no stigma whatsoever. Thousands of citizens are voluntarily fingerprinted every year. Members of the United States Army and Navy are all fingerprinted, as are many Government workers. In recent years, many hospitals have established the practice of taking footprints of newly-born babies. Because fingerprinting is the only infallible method of accurate identification, the United States Government has adopted it as part of its registration program.

In signing the Alien Registration Act, President Roosevelt said: *"The Alien Registration Act of 1940 . . . should be interpreted and administered as a program designed not only for the protection of the country but also for the protection of the loyal aliens who are its guests. The registration . . . does not carry with it any stigma or implication of hostility towards those who, while they may not be citizens, are loyal to this country and its institutions. Most of the aliens in this country are people who came here because they believed and had faith in the principles of American democracy, and they are entitled to and must receive full protection of the law."*

Solicitor General Biddle adds: *"We should remember that all Americans were at one time or another immigrants from other lands. The genius of many countries, the ancient aspirations of many races, have built into what is America. Unfortunately, there are some foreigners who are disloyal to America, who do not wish to accept our ways and who use our freedom of speech and of the press to foment disunity and sedition.*

"These persons we will apprehend, but we will also see to it that loyal American aliens are not unjustly condemned for the disloyal behavior of a few. Our registration will be their protection from persecution."

The Immigration and Naturalization Service asks for the cooperation of all citizens in carrying out the Alien Registration program in a friendly manner, so that our large foreign population is not antagonized. It is suggested that citizens may be of great help to their non-citizen neighbors or relatives by explaining to those who do not speak English well what the registration is, where aliens go to register, and what information they must give.

The Registration of Aliens program has been set up as a separate division of the Immigration and Naturalization Service. The program is being directed by Earl G. Harrison, under the general supervision of Major L. B. Schofield, Special Assistant to the Attorney General.

G. E. Turbine Orders Hit New High

Marine turbine-propulsion equipments and land turbine-generator sets ordered from General Electric during the first six months of 1940 totaled more than 2,000,000 horsepower, according to *E. O. Shreve*, vice president in charge of sales for the company.

The half-year volume of turbine business exceeds that of any comparable period in the company's history,

Slightly more than half of the 2,000,000 horsepower has been ordered by utilities and industrials. The remainder is made up of marine equipments ordered to provide propulsion for 25 new Navy and merchant vessels.

The full resources of General Electric's engineering experience and manufacturing facilities have been enlisted to assure that the orders will all be filled as speedily as possible.

The energy produced by the marine turbines will be harnessed through reduction gears weighing as much as 100 tons

Most of the marine gears will be manufactured in a mammoth, specially-equipped shop in which the temperature is constantly maintained within two degrees of 72° F. Such close temperature control is absolutely necessary to prevent even a minute expansion or contraction of the huge gears while the teeth are being cut to tolerances measured in ten-thousandths of an inch.

The marine orders listed in the total include equipments for a super battleship, light cruisers, destroyers and a mine layer.

Propulsion equipments ordered for merchant-type ships represent an increase of 144 per cent over purchases of the same equipment in the first half of 1939. Merchant vessels for which G-E turbine-propulsion equipment has been ordered in the first six months of 1940 include three speedy passenger-cargo ships for the Delta Lines, three tankers for Texas Oil Co., four for Sinclair Oil Co., two for Keystone Tankship Corp. and two for Socony Vacuum Oil Co.

General Motors Diesel Division Expands

Construction of two additions to present buildings by the Cleveland Diesel Engine Division of General Motors Corporation, 2160 West 106th Street, Cleveland, Ohio, will be started soon to provide room for increased production made necessary by recent orders and the prospect of continued steady volume on a higher level than heretofore, *George W. Codrington*, general manager, announced.

The additions will total 37,650 square feet of floor space. One wing, 100 x 240 feet, will be added to the present test building, and another, 65 x 210 feet, will go on the present assembly building. The additions will be of the same steel and glass design as the present structures.

The Division not only has on hand a large volume of orders for diesel engines and other marine propulsion equipment from the U. S. Navy, but acceptance of the GM version of diesel-electric drive for commercial vessels of all sizes and types is rapidly increasing, Mr. Codrington said. The Division has developed a highly effective type of marine diesel-electric drive, now used on dozens of ships on both coasts, the Great Lakes and other inland waterways.

Forward deck.

Tampa Delivers Sea Witch—

C-2 Motorships Nordberg

Sea Witch, a beautiful, sturdy C-2 type cargo motorship, first of eight building at the yard of the Tampa Shipbuilding and Engineering Company, was delivered to the U. S. Maritime Commission on July 30 after satisfactory sea tests.

She was immediately turned over to the United States Lines for service in their American Pioneer Line out of New York to the Far East. With Captain Samuel Lee in command, she cleared New York on her maiden voyage on August 15.

Propelled by twin Nordberg diesel engines, she has a speed of 16 knots, which will enable her and three sister ships now being completed to establish the fastest regular direct-by-sea cargo service between the East Coast of the United States and the Far East.

On her regular run, the Sea Witch will have as ports of call Manila, Shanghai and Hongkong. She will voyage to Manila in 35 days. On the Atlantic Coast the vessel is regularly scheduled to call at Baltimore, Philadelphia, Hampton Roads and Savannah, in addition to New York.

Sea Witch is of 13,900 tons displacement and has a length of 459 feet and a molded breadth of 63 feet. On her outward voyage she will carry, in addition to general cargo, chemicals, petroleum products, machinery, fertilizers, steel, automobiles and parts, cotton goods and electrical supplies. Homebound she will bring silk, sugar, hemp, Chinese food products, minerals and bulk oils.

The new cargo liner has several deep tanks for liquid cargoes, and for general cargo she has five holds, three forward and two aft of the midship house, all arranged for overhead loading. Her approximate total bale capacity is 558,270 cubic feet, which includes 94,700 cubic feet of deep tank space in holds 2 and 4.

For loading and discharging, Sea Witch is equipped with 12 single-speed, single-drum, three-ton winches and two two-speed winches for handling a three-ton load on a single whip and a 30-ton load through a seven-part purchase.

Sea Witch.

First of Eight Powered with Diesel Engines

Pilot house.

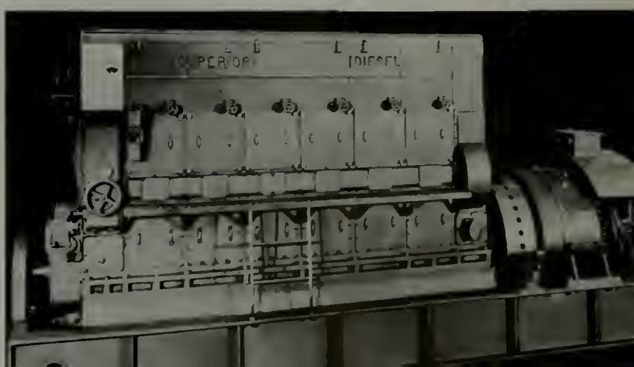
All of these winches were supplied by the American Hoist and Derrick Co., and each is driven by a Westinghouse 45-hp electric motor. Numbers 1, 4, and 5 hatches are single-ganged, and Nos. 2 and 3 double-ganged. Number 3 hatch has a 30-ton boom, and other booms are designed to load up to five tons.

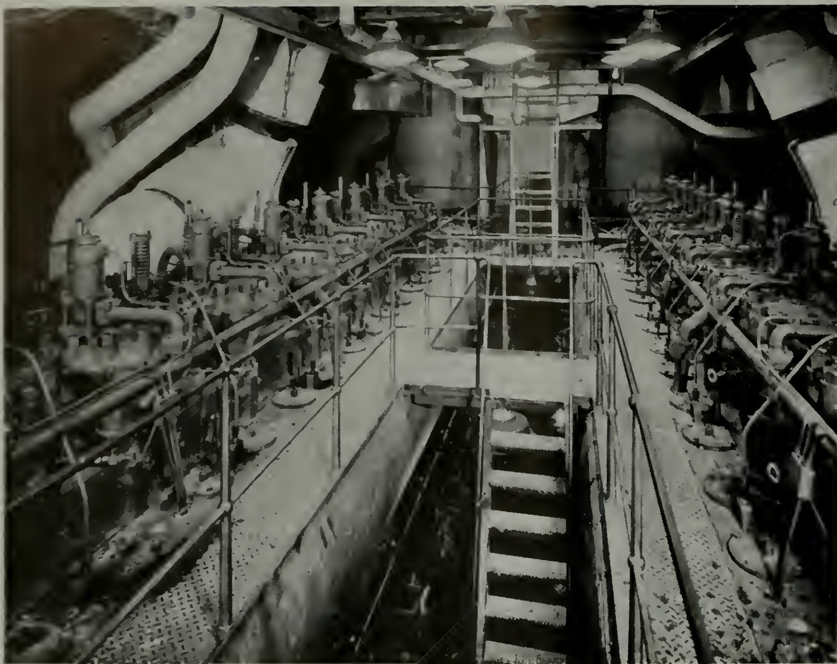
A special feature of the Sea Witch is a cargo ventilating system designed to operate even in the severest weather. All holds exhaust through kingposts of a weather-proof design, and in contrast to the traditional cowl vents. Mechanical input and natural exhaust ventilation is provided in holds 2, 3 and 4, and in holds 1 and 5, natural supply and exhaust ventilation.

Crew accommodations of the Sea Witch are outstanding. The captain and the chief engineer have suites with private bath. All 41 of the crew are berthed in the midship house, chiefly in two- and three-berth rooms, and each room is fitted with: a lavatory with hot and cold water piped in; individual steel lockers; individual bed-reading lights; and overhead air ducts for ventilation. Ample bath and toilet accommodation is installed. She is not equipped for carrying passengers.

Above: Officers' mess.

Below: Auxiliary generator set.





Upper platform of engin room, Sea Witch, featur ing cylinder heads an fuel valves.

Floor of engine room, looking forward along center aisle, showing fuel pumps and cylinder lubricators.

Propulsion Machinery

The propulsion machinery of Sea Witch comprises two Nordberg 2-cycle, 9-cylinder, cross head construction, mechanical injection type, direct-reversing diesel engines, each rated 3155 brake horsepower at 225 rpm. Each engine is connected through an American Blower Company Vulcan type hydraulic coupling to one of the pinions of a Falk single-reduction gear set. The wheel shaft of this set is directly coupled to the propeller line shafting.

The hydraulic couplings have a slip loss of approximately 3 per cent, and the mechanical gear set a friction loss of approximately 2 per cent, so that the overall efficiency is 95 per cent, resulting in 3000 shp on the propeller shaft at 92 rpm.

The engines are required to be able to run continuously at 10 per cent overload (3470 bhp), and for two hours at 25 per cent overload (3950 bhp), or a total maximum power available for propulsion of 7500 shp.

The cylinder bore is 21 inches and the piston stroke 29 inches. The cross heads, of cast steel with an integral babbit lined slipper, are bolted to the lower end of long piston skirts, thereby eliminating the piston rods. Pistons are oil cooled. Cylinder heads and jackets are cooled by fresh water in a closed system with a heat exchanger, wherein the fresh water is cooled by salt water.

Scavenge air is supplied by a Roots type positive-displacement, two-lobe rotary blower mounted at the after end of each engine and driven through gearing from the crank shaft. Superimposed on each blower is a butterfly valve connected with the reverse mechanism in such fashion as to provide unidirectional flow of scavenging air irrespective of direction of crank shaft rotation. Scavenging air is maintained at 2½ psi in a large header running full length of the engine, and is supplied to the scavenge ports of each cylinder through automatic non-return valves.

A speed-regulating and an independent over-speed governor are fitted to each engine, and are capable of holding the speed within 5 per cent variation and of cutting off fuel at 10 per cent over-speed on the range between full and half power.

Engine control and reversing is accomplished by a simple adaptation of the Burmeister & Wain control system (Nordberg Manufacturing Company is the American licensee of Burmeister & Wain). These controls, together with those for the hydraulic couplings, are all located at a central control stand located at the forward end of the engines. The reversing and control levers are arranged to control both engines with one set of levers. Interlocks prevent incorrect operation.

A force-feed circulating system provides for lubricating all working parts of the main engine. Cooling oil from the pistons and lube oil from the bearings and the couplings goes to a sump tank under the engines, from which it is pumped through a duplex strainer and a tubular oil cooler and delivered under pressure to the engine parts requiring lubrication.

The camshaft, located on the inboard side of each engine, is housed in a steel casing and is driven by gears from the crankshaft. An individual Bosch fuel pump is mounted atop the camshaft housing opposite the center of each cylinder, and is directly driven by the camshaft. Duplex Nugent filters are fitted in the fuel lines.

Alongside each fuel pump, and also driven by the camshaft, is a Manzel cylinder lubricator with six feeds.

The first engine was subjected to a grueling shop test. An endurance run of 240 hours at rated full power and speed followed immediately by 48 hours at 110 per cent rating and two hours at 125 per cent rating, or a total of 290 hours continuous run at full load or more. The runs were made with a hydraulic brake for measuring the load, and with the hydraulic coupling installed between the engine and the brake. Fuel consumption was carefully measured.

Fuel used in the shop tests averaged 13½° Baume at 60° F., and had a viscosity of 240 sec. Saybolt at 70° F. The fuel consumption curve is unusually flat over the range from 50 per cent to 125 per cent load. At 75 per cent and full load, the fuel consumption, based on 19,500 B.t.u. per pound of oil, is 0.37 pounds per bhp hour. At 110 per cent it is just under 0.37 per bhp hour, and at 125 per cent it is 0.39 per bhp hour.

Exhaust temperatures varied from 350° F. at 75 per cent load to 475° F. at 125 per cent load. Mechanical efficiency is 85 per cent at normal rating and thermal efficiency. The engines operated smoothly at one-fourth speed.

Reversal from full speed ahead to full speed astern under full load (with the water brake connection having an inertia value closely corresponding to that of the shafting and propeller on the ship) required from 13 to 15 seconds.

On the ship, the hydraulic couplings use lubricating oil as an operating medium. It requires 870 gallons of oil to fill each coupling and 70 gallons per minute leak off for dissipation of heat. Each coupling consists of: two radially-vaned members, called primary rotor and secondary rotor; and an enclosing cover, called the secondary rotor housing.

The oil is delivered to each coupling through a hole drilled in the center of its pinion shaft; escaping oil is caught in a stationary housing from which it is led to the lubricating oil sump.

The gears are lubricated by the Falk self-contained controlled-splash system, using an extreme pressure compound of the lead base type and completely independent of the engine lubricating system.

For auxiliary power, Sea Witch carries two 300-KW Westinghouse D. C. generators each driven by a direct-connected, 6-cylinder, 11½"by 14" Superior diesel engine rated 450 bhp at 514 rpm.

To supply electric light in emergencies, a 5-kw Westinghouse generator is installed, driven by a Hill 10-hp diesel engine, which is started automatically whenever the auxiliary power fails for any reason.

This engine and the Nordberg main propulsion engines are equipped with Maxim silencers. The Superior auxiliary diesels are equipped with Burgess snubbers. The main engines exhaust through a Foster Wheeler waste heat boiler.

The electro-hydraulic steering gear, of the single ram Rapson slide type operated by two 50-hp Westinghouse motors, was built by the Struthers-Wells Co. A Sperry electric control is provided, and in the wheel house a Sperry gyro pilot, a Sperry course recorder, a Sperry searchlight and Sperry master gyro compass and repeaters.

Mackay radio direction finder and Mackay transmitting and receiving equipment are installed.

Panama Canal Tugs Built at Berkeley

First All-Welded Steel Tug Hulls Built by Private Firm in San Francisco Bay Area

On August 27 two all-welded steel tugs, the Chame and the Diablo, built by the Berkeley Steel Construction Company for service in the Panama Canal, were hoisted onto the deck of the steamer H. M. Baxter and shipped to Balboa to be delivered to the U. S. Army authorities.

All details of these hulls were redesigned for welding by the technical staff of the builders, and the result is a sturdy, competent towboat hull with graceful lines and a fine sheer.

Principal characteristics of the design are:

Length O.A.	55' 0"
Beam	14' 0"
Draft	6' 0"
Propulsion power	200 bhp
Propeller speed	400 rpm
Displacement	50 tons
Speed	8 knots

The hulls were fabricated and erected in the Berkeley shops of the builder. When ready, they were carted out to Richmond and launched in the harbor there, and the engines and other equipment installed. After satisfactory trials on the bay, they were completed in every detail before shipment to Balboa.

The hulls are divided into four compartments by three watertight bulkheads. From forward to aft these compartments are: the forepeak and chain locker; the crew's quarters, with comfortable all-metal berths and lockers for four persons; the engine room; and the after peak and ship's stores. The sole superstructure on the main deck is the pilot house, with a raised deck extending aft over the engine room.

Broadside view of tug Diablo.

Propulsion Plant

For propulsive power each of these tugs has a six-cylinder, directly-connected, fully-reversible Enterprise diesel engine rated 200 bhp at 400 rpm. This engine, of 9½-inch bore and 11-inch stroke, has totally-enclosed valve gear and single-lever maneuvering control. It is fitted with Vortex silencers, Viking safety controls, Kingsbury thrust bearing. Cylinder jackets and heads are fresh-water cooled in a closed system using a Ross heat exchanger to reduce the temperature of the coolant. Power is delivered to the propeller through a 6-inch bronze shaft with Cutless rubber stern tube bearings.

The propeller was especially designed and produced for these tugs by the Federal Mogul Corporation of Detroit. It is a three-bladed solid bronze wheel 48 inches in diameter and of 28 inches pitch.

In San Francisco Bay trials on the measured mile, speeds were devel-

oped up to 9.26 knots, with an average of 8.53 knots.

Auxiliary Equipment

The equipment of these tugs is simple and efficient, but very complete.

A Rix compressor with gasoline engine drive provides starting and maneuvering air. A Westinghouse 2-kw generator, belt-driven off the main engine, provides lighting and power for small motors and charges an Exide Ironclad storage battery that takes care of these functions when the main engine is idle.

A Briggs clarifier keeps the lubricating oil in proper condition.

A Micro-Westco fire and bilge pump, driven by a Fairbanks, Morse electric motor, keeps the bilges dry and provides a good stream of water for fire fighting.

The engine room and the crew's quarters are protected from the tropical heat by 3 inches of cork insulation, and from fire by a complete C-O-Two fire extinguishing system with control in the pilot house.

Plumbing comprises two Crane toilets and two Sand's lavatories. Fresh water, lube oil and fuel oil are all transferred from storage to service tanks by individual manually-operated Blackmer gear pumps. All valves are Walworth.

The electric equipment and fixtures were all installed by Ets-Hokin and Galvan of San Francisco.

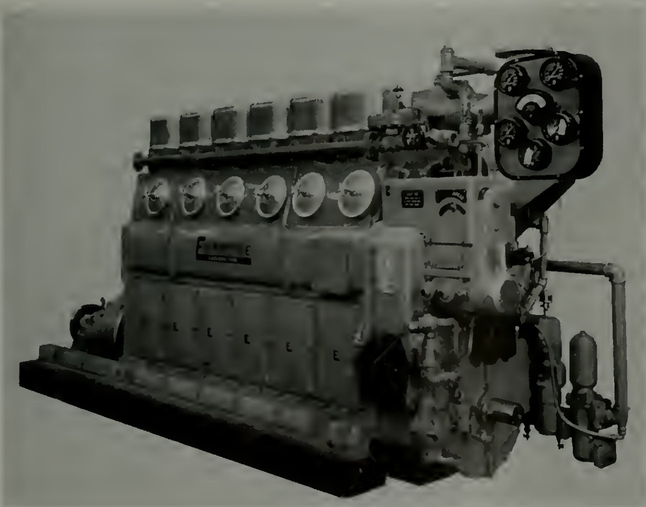
Bow view of tug Chame at full speed with the picturesque Berkeley hills in the background.

Included are: Cutler Hammer motor controls; Bendix running light control and tell-tale board; Carlisle Finch searchlight with pilot house control; and the lighting circuits and fixtures.

Navigating equipment includes: A Ritchie compass, supplied by Louis Weule & Sons, San Francisco; a Kahlenberg pneumatic horn; a mechanical helm-angle indicator; a Seth Thomas marine clock; and a fine steering wheel connected to the tiller by wire cable and gear.

In short, the Diablo and Chame are complete towing plants capable of instant response to any demand within their capacity.

These tugs were built under the supervision of the Superintendent of Design and Construction for the U. S. Engineers. They are the first all-welded steel tugs built by a commercial firm on San Francisco Bay. Berkeley Steel Construction Company deserve great credit for the successful completion of this pioneer effort. The experience gained may lead to the establishment here of a new industry specializing in welded steel hulls for all types of harbor and offshore commercial and Government workboat hulls.



One of these six-cylinder, 9½ inch by 11 inch, direct connected, fully-reversible Enterprise diesel engines forms the power plant of each tug.

S. S. America—

Machinery and Equipment, Labor and Art Work, Furnishings and Materials from All Parts of The United States

Above: The sports deck between the stacks, featuring the only out-of-doors handball court ever built on a ship.

Below: A perfect circle 85 feet in diameter, America's first class smoking lounge is a very striking and attractive room.

An All-American Liner

The new United States luxury liner America qualifies in every respect as all-American.

From the Oregon pine which plank her decks to the Rhode Island and Connecticut silver which graces her tables, from her steamer blankets manufactured in Ohio to her Fremont Ellis murals painted in New Mexico, her materials originate in the United States or their possessions.

Practically every state in the Union contributed to the building of America. Raw materials — wood, metals, cottons, wools — originated in the West or the South. The industrial East supplied finished products. Printing shop equipment from the District of Columbia and New York; sound motion picture apparatus from New Jersey; barber and beauty shop accessories from Illinois; table-cloths and linens in part from Pennsylvania; and gymnasium equipment from Missouri and Michigan help furnish her.

Locks for her stateroom doors came from the famous Schlage Lock factory at San Francisco, Calif. San Francisco also furnished her Remler radio emergency intra-ship communication system. Annunciators, blowers and instruments were contributed by Massachusetts; airports by Delaware; nuts, bolts by Maryland; indicators by Indiana; pumps by Minnesota; lead by Colorado; aluminum by Utah; separators by Virginia; silver by Nevada; copper by Montana; cotton by South Carolina; and wool by Idaho.

Many other states would be represented in the original production of the materials involved, but these are sufficient to show that the building of a large passenger liner touches intimately the economics of every corner of the nation.

American Artists Contributed

The artists who decorated the America were also representative of the entire nation. Her muralists include Glenn M. Shaw of Ohio; Howard B. French of New Jersey; Griffith Bailey Coale and Barry Faulkner, among others of New York; Austin Purves, Jr., of Connecticut; and Fremont F. Ellis of New Mexico. Dorothy Liebes of San Francisco wove drapes for the ship, and Puerto Rico has supplied a hand-woven, "carved" carpet.

Peak Employment 2500

For 130 weeks—more than two years—the construction of America has employed hundreds of men — meant wages for thousands of families. The average number employed on her was 1200 men each week, and at the peak of the job, 2500 worked on her hull and equipment at the Newport News Shipbuilding and Dry Dock Company.

Another 1200 men were employed for the total 130 weeks producing materials outside the yards, and nearly 300 companies contracted to furnish supplies. More than 1,000 other companies, it is estimated, received orders through these contractors.

$10,700,000 in Wages

Wages represent the largest single item in the cost of the new $17,500,000 luxury liner. Shipyard labor alone received about $5,385,000, or nearly a third of the vessel's cost. About $5,380,000 additional was paid to labor for fabricating materials outside the yards. Still other money went to railroad men, employed on the task of routing to the yards materials on which about $725,000 in freight charges was paid.

Above: The central clerestory of the first class lounge.

AMERICA'S PASSENGER ACCOMMODATIONS

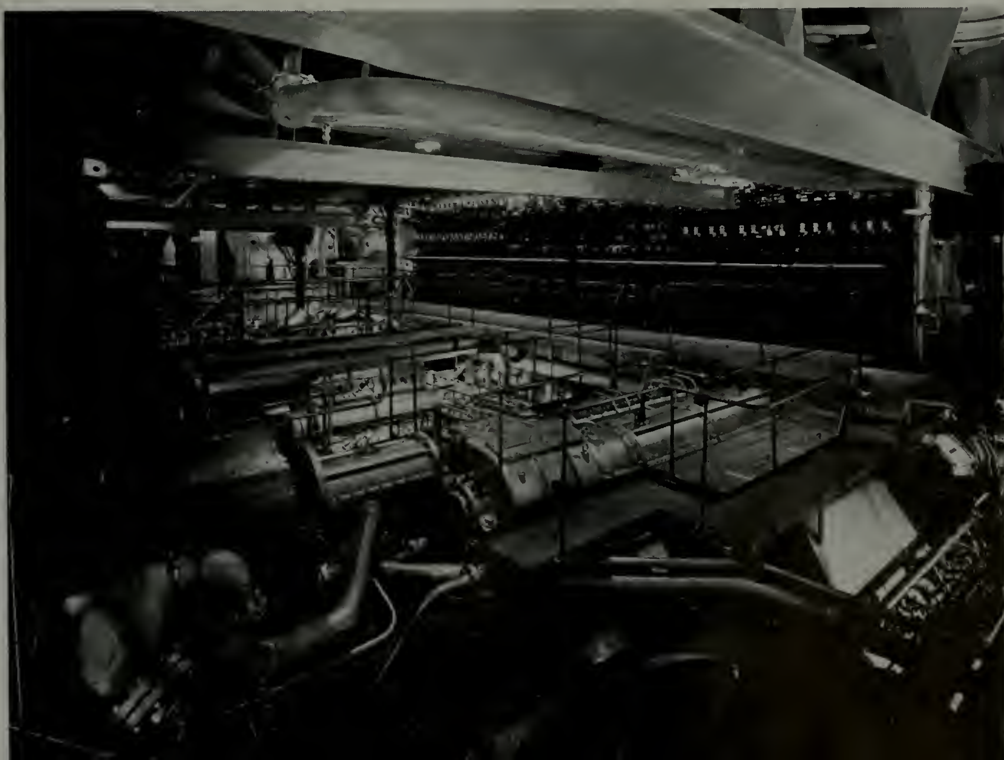
Below: A first class stateroom.

Above: A verandah suite

At left: A corner in the main galley, featuring lavish use of stainless steel and Monel trim.

Below: Cafe and lounge.

Above: The spacious, unobstructed sports deck of S. S. America. Below: The engine room, featuring her Newport News turbines, De Laval gears, Westinghouse generating sets and switchboard.



Radio Installation ON AMERICA

First American Radio Installation Designed Especially for a Ship Before the Ship's Keel Was Laid

By Charles J. Pannill

President, Radiomarine Corporation of America

Radio equipment aboard the S. S. America, this country's new queen of the seas, is the finest and the most comprehensive ever installed on an American luxury liner. Providing a maximum of service in radio communication, navigation and safety, the installation was for the most part designed especially for the America, and all of it was custom built. Moreover, it represents the first case in which an American passenger ship has had its radio installation planned and designed in advance of the vessel's construction.

The ship's radio room is a show place. In charge of a complement of five radio officers, it is open 24 hours a day for telegraphic messages, and from 9:00 a.m. to 12:00 midnight for radiotelephone messages.

Here are located five radio transmitters and five radio receivers and the radio auto alarm. Four of the transmitters are used in radiotelegraphy and one in radiotelephony. The frequency band and the approximate power delivered into the antennas of the four radiotelegraph transmitters are: 110-160 kilocycles, 1000 watts; 350-500 kilocycles, 1000 watts; 4-22 megacycles, 1000 watts; and 375-500 kilocycles, 50 watts. The same ratings for the radiotelephone unit are 4-18 megacycles, 600 watts.

Radio room on America, featuring the control console.

The main radiotelegraph operating controls are conveniently arranged in a specially-designed console 9½ feet long. Three receivers are housed in the console, and here also are to be found the start-stop switches for the motor generators, frequency selector switches, signals lights, and the antenna switching panel for selection of any of the five receiving doublet antennas for either of two high-frequency receivers. Then there are four loudspeakers and switches, which permit a combination for monitoring by speaker or earphone. Other switches enable a connection between any of four receivers and a loudspeaker on the ship's bridge.

Still other panels contain the main radiotelephone controls. A feature of this particular equipment is a speech-inverting, or "scrambling," device which establishes two-way privacy in all radiotelephone conversations.

Apart from all of the main equip-

ment in the radio room is the emergency radiotelegraph transmitting and receiving position. This is a 50-watt transmitter which can operate when all the main power generators fail. It operates on emergency generators, and has in reserve two sets of storage batteries, which enable communication when all other sources of power are unavailable. Also at this position are two receivers, one of which covers the frequencies from 15 to 500 kilocycles. The other one, a type B crystal receiver, operates without batteries or tubes.

Finally, in the radio room, there is the radio auto alarm, which, so far as is known, is the first case of a passenger vessel operating a 24-hour radio watch being so equipped. It is always alive to the emergency distress signals of other ships, and automatically sounds a bell in the radio room and on the bridge when such signals are picked up. This installation, providing additional safety to other ships, is useful because if, in time of emergency, the America's operator was receiving on some frequency other than 500 kilocycles he would not know that the other ship was sending an alarm.

A 75-watt radiotelephone set, operating on a frequency band of 2 to 3 megacycles, is installed in the ship's chart room just aft of the bridge. This is used only for shipping business, such as communicating with tugs during docking operations and with the pier and home office while the ship is in the harbor. During stand-by, the receiver of this unit is tuned to the coastal harbor radiotelephone frequency. When signal is picked up, it is fed into a selective signaling device which responds to certain audio frequencies. If the proper sequence is sent out by the shore station, a bell will ring aboard ship to indicate an incoming call.

Positioned conveniently to the navigation officer in the wheel house is a radio compass.

Two lifeboats are equipped for two-way radiotelegraph communication at 500 kilocycles. Using storage batteries as sources of power, these sets will function for many hours.

Counting the two lifeboat antennas, the radio compass loop antenna, the 75-watt radiotelephone antenna, the five doublet receiving antennas, the main flat-top antenna, the horizontal V and the forward V antennas, there are thirteen antennas aboard the ship.

The emergency radio telegraph position.

The America's radio installation called for more than 10 tons of equipment, 4½ of which were made up of special high-voltage cable. The work of installation started on May 6 and was completed on June 7. At times, as many as 18 men worked on the installation. All of the equipment, except the auto alarm, the lifeboat sets and the radio compass, is owned and serviced by the Radiomarine Corporation under lease to the United States Lines.

Signaling Efficiency Improved

Last fall a destroyer squadron commander reported to the Navy Department that in many instances his destroyers engaged on neutrality duty had difficulty in establishing visual signal communication with merchant vessels, and asked if the situation might be improved by enlisting the interest of the Government offices concerned, the shipowners and officers, and men of the merchant marine. The Navy Department communicated with the Department of Commerce and with the Maritime Commission.

Both the Navy and the Coast Guard understand fully the reasons why a merchant vessel is unable to send signals as rapidly and efficiently as the Navy and Coast Guard vessels.

The Bureau of Marine Inspection and Navigation and the Maritime Commission brought the matter to the attention of the merchant marine, and the merchant marine personnel, with entire good will, set about to improve the signaling ability of individuals and facilities aboard ship for signaling. There is a steady and satisfactory improvement.

No Criticism Intended

Unfortunately, an impression has got abroad that the Navy has criticized the merchant marine in this respect. The object of this notice is to dispel that impression. There has been no criticism or adverse comment on the part of the Navy. On the contrary, the Navy Department has repeatedly expressed its appreciation of the good work done by merchant marine officers and the progress which is being made in the improvement of visual communication — a vital factor of safety.

Great Improvement

The ratio of successful communications established during April was 80 per cent, as compared with 69 per cent in January. Out of 209 vessels contacted, 167 carried out the exercises to a successful conclusion. Heading the list of the fleets joining in these exercises are: The Standard Oil Company of New Jersey, with 14 ships, 9 of which are especially noted for their excellent signaling; and the American-Hawaiian Steamship Company, with 9 ships.

An interesting sidelight is the fact that the sales of H.O. No. 87 Signal Manual have more than doubled in recent months.

The Bureau of Marine Inspection and Navigation congratulates merchant service officers and men on the cooperation they have shown with the Bureau's drive for increased signaling efficiency.

(Condensed from the **Bulletin** of the Bureau of Marine Inspection and Navigation.)

Most Modern Steam Tugs

Two More Streamlined Tugs by Pusey & Jones Equipped With Skinner Unaflow Engines

The two steam tugs H. S. Falk and J. P. Pulliam, which have been recently delivered to the Donaldson Towing & Lightering Company (Curtis Bay affiliate) and the Pusey & Jones Corporation of Wilmington, Delaware, are each equipped with a twin-cylinder Skinner Marine Unaflow engine. These engines are in every way duplicates of those installed four years ago in the tugs Carolyn and H. C. Jefferson, owned by the same company.

Although the engines on the Carolyn and H. C. Jefferson have been in night-and-day operation, much of the time working under heavy overload conditions, there have been absolutely no repairs or adjustments of any kind.

While they have a normal rating of 600 indicated horsepower, they can easily develop 50 per cent overload when necessity demands. This capacity for temporary overload is very important in all operations afloat, and particularly so in tug operation. No other type of marine prime mover has this overload capacity to as high a degree as the Unaflow engine. (On a recent special run on the tug H. C. Jefferson, indicator cards taken showed 987 ihp.)

Another factor that favors the Unaflow marine steam engine is that there is practically a flat economy rate at all normal loadings. The engines installed on the H. S. Falk and J. P. Pulliam are guaranteed to develop their full load of 600 indicated horsepower on 12.2 lb. of steam per ihp.-hour, and when operating at one-quarter of this horsepower on 11.3 lb. of steam per ihp.-hour, with the steam pressure of 175 lbs., superheated to 100 degrees.

All Skinner Marine Unaflow engines are equipped with permanently steam-tight valves, which will maintain their steam-tightness for years without any attention, which is not the case of steam engines equipped with piston or pressure-plate valves.

Steam tug H. S. Falk

Lubricating System

The engines are fully enclosed and force-feed lubricated. The crank case drains to a sump equipped with a float valve, and the oil is drawn from this sump by a small steam duplex pump and is forced through an oil cooler and strainer to the main oil tank. A second pump picks the oil up from the tank and forces it under approximately 40-lb. pressure to all bearings of the engine. This oiling system lubricates every moving part of the engine. No oil cups or grease cups of any type are used.

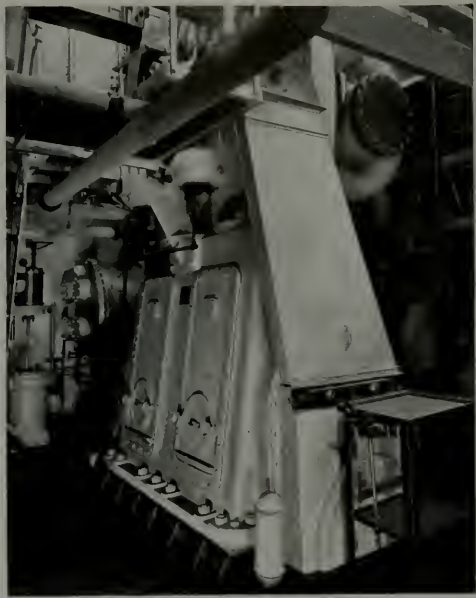
There are three oil pumps, one being a spare, and all three are compactly mounted on top of the oil tank, with cooler and strainer, this assembly being furnished as a complete unit for mounting in the engine room.

The piston rods are equipped with oil wiper cases, which keep out of the crank case any condensation from the cylinders, and prevent leakage of oil. A single charge of oil will serve for many months in this closed system without renewal.

Occasional small quantities are added to keep the system full.

With superheated steam, cylinder lubrication is recommended, although it is possible to operate these engines without cylinder oil with the superheat limited to about 25 degrees. The builders, however, believe that with the efficient oil-separating system provided, it is better to use oil on the cylinders with or without superheat. Lubrication of cylinders improves the mechanical efficiency and greatly increases the life of the cylinders and piston rings, as compared with non-lubricated operation.

Therefore, a force-feed cylinder oil pump is provided, driven from the engine, with sight feeds which can be adjusted to keep the cylinder oil usage to a minimum. One feed is conducted to a point just ahead of each of the four poppet inlet valves, and two additional feeds are carried to the steam line at the throttle.



The twin cylinder Skinner Unaflow steam engine as installed in modern tugs is a compact unit of sturdy construction and high overload capacity.

Controls

The controls for the main engine are mounted on the upper deck and short-coupled direct to the cam box, from which the poppet inlet valves are operated, eliminating the power reverse gear commonly used on triple-expansion engines.

The control is entirely by cut-off for stopping, starting, reversing and running in either direction, one lever being provided for cut-off ahead, and one for cut-off astern. A third lever is provided for controlling the throttle valve.

With the cut-off control, full steam pressure is obtained in the cylinders for all load conditions, thereby gaining nearly full expansion of the steam and eliminating the throttling condition used heretofore on reciprocating engines.

It is for this reason, combined with the permanently steam-tight valves employed, that excellent economies are obtained over a wide range of speed and load conditions, which are highly desirable for tug application.

This control gives exceedingly quick action and response, and the engine can be reversed, stopped and started with the throttle wide open.

On an acceptance test made on another tug equipped with a Skinner Marine Unaflow engine, the engine, when propelling the ship ahead at a speed somewhat above the contract conditions, was instantly reversed without closing the throttle, and the ship started to move astern in 40 seconds after throwing the reverse lever.

The cylinders, cylinder heads and pistons are cast from special alloyed semi-steel, using nickel, chromium and molybdenum. They have a close-grained, smooth-finished hard-cylinder wall surface, the life of which is far superior to conventional engine cylinders. The pistons are of special alloys. Piston rings used on previous installations, with 300-lb. pressure and 200 degrees superheat, still showed some of the original tool marks after 3 years of operation, covering approximately 280,000 miles.

The piston rod packings are of the full metallic type, using sectional bronze rings requiring no repacking or tightening up for long periods of operation.

The valve gear consists of an enclosed cam box containing the reversing mechanism, the cams and shafts, and tappets.

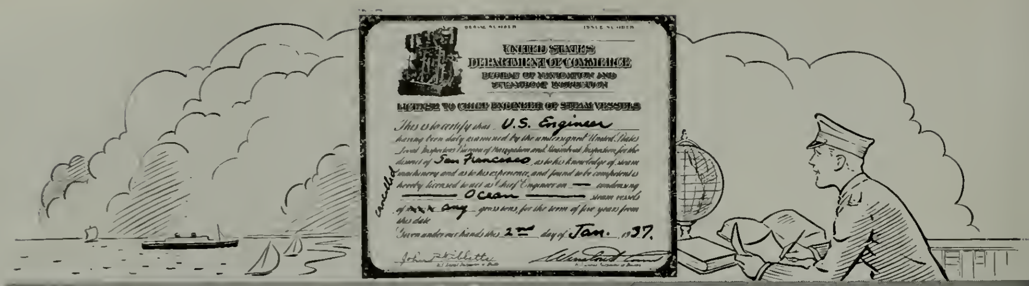
These tappets operate the double-beat steam-tight expansion-compensating inlet valves, of patented design, with flat seats which are ground in cold and need no further attention.

With the design of valve gear employed, which is used only on Skinner Marine Unaflow steam engines, a perfect neutral is obtained, and the indicator cards are well balanced, from a "shoestring" friction load condition to large overload conditions.

The bored guides of the self-aligning type are another original feature. The connecting rods and connecting rod bolts, crossheads and piston rods, are made of heat-treated alloy steels of high tensile strength and high ductility.

The crankshaft is a single-piece forging made to American Bureau of Shipping Grade Two specifications, and is fully counterbalanced, giving smooth performance, and free from vibration at speeds considerably in excess of normal.

The overall dimensions of these engines are approximately 6 feet 6 inches width of base, 9 feet length, 13 feet 5 inches from the center of the shaft over the top. These compact dimensions give ample space in the engine room for mounting all auxiliaries with more than usual accessibility, leaving ample room to insure safe working conditions for the operating crew.



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Questions from the Ships

QUESTION

"The solutions offered by marine engineers and others for the capacity of a coal bunker are not clear to me, as they do not check with my high school teaching of geometry. The problem is: A bunker is 30 feet long, 18 feet deep and 18 feet wide at the top, 14 feet wide at the middle and 10 feet wide at the bottom. I am told to get the area of the end section and multiply by the length. This is clear. But they tell me to get area of end section by adding the top and bottom width to 4 times the middle width, dividing the sum by 6, then multiply by the height. This gives 18 + 4 × 14 + 10 = 84. Divided by 6 is 14, or average width. Multiplied by 18 is 252 sq. ft. area. Why shouldn't I just take 18 + 14 + 10 = 42, and divide by 3 = 14 average width? We get the same answer. So why use 4 × the middle dimension?"

F.J.P., San Francisco.

ANSWER

The problem given is one where the two answers are the same, because the average of the 3 numbers is 14, and this also *happens* to be the middle dimension, so that we could multiply it by any number we want, such as 8 or 20, then divide by 10 or 22 and get the same answer. Where the middle dimension is also the average, the bunker is not bulging, but is a straight side, i.e., the sloping side is a straight line, not a curve bulging out, like the side of an ordinary ship. See Fig. 1, area closed by line TAB.

Suppose the dimensions of the section were 18 at top, 17 at middle, 10 at bottom. Then the average is 18 + 17 + 10 = 45. Dividing by 3, we have 15 feet. See Fig. 1. The arithmetic average of three dimensions gives area closed by lines RS.

By the recommended method, we have 18 + 4 × 17 + 10 = 96, and dividing by 6 we find an average of 16. See Fig. 1. The special average gives area O + P × Q.

The factor of 4 is used because it fits the ship's bunker, as it gives 4 times the importance of the middle width that it does to the top and bottom. In other words, it indicates that the shape is such that it changes width rapidly in the top 1/6 and bottom 1/6, but the change is slow or slight in the middle 4/6.

However, the accepted method of using a factor of 4 on the middle dimension has the same error as in the following problem—that of using in the average dimension the extreme top and extreme bottom widths. These should not be used. To illustrate, take the frequently-presented problem illustrated in Fig. 2. A bunker 30 feet long is 12 feet deep. It is 6 feet wide at the top; 6 feet at a point 6 feet, or one-half way down; 5.5 feet wide at 8 feet from top; 3 feet wide at 10 feet from top; and 2 feet wide at bottom.

The solution is, of course, simple after getting the area of the end. The procedure of getting the area, as accepted by marine engineers, examiners and educators, is first to compute the area of the regular section as 6 x 6 = 36. Then get the average width of the lower section by taking the average dimension, including the upper and lower one, thus, 6 + 5.5 + 3 + 2 = 16.5. Dividing by 4, we get 4.125 as an average. Then times the height gives 6 × 4.125 = 24.75, and adding 36, we have 60.75 sq. ft. for total area of end of bunker. This is a practical and empirical rule, and is accurate enough where the side curves out at one place and curves in at another, like Fig. 2, but would not be so accurate if bunker was curved as in Fig. 1. Thus it is only good for the special case of the double curve bunker.

The rule as given uses 4 dimensions, but they include the extreme top and bottom. The use of 4 measurements then divides the section into 4 smaller sections, takes the sum of the individual areas, as illustrated in Fig. 2. However, the top sub-section has a width which is more than its own average or mean width, and the bottom a width which is less than its own mean width. The intermediate section

also has a dimension which is not the same as its own mean width.

The mathematically-correct way to approximate the area of the irregular part of the end section is as shown in Fig. 3. We again assume that 4 dimensions will give the required degree of approximation, but instead of measuring at extreme top and bottom, we measure 1/2 a section height down from the bottom, at E, then F, G and H follow a section height below, leaving width H 1/2 section up from the bottom. This insures that the width of each section used will be its *own true* mean or average. Thus for the same number of measurements taken, it gives a closer approximation to the true value.

It is understood, of course, that the greater the number of measurements taken, hence the greater the number of sub-sections used, the closer the approximation is to accuracy.

To make a mathematically-correct approximation, the width of the individual sub-sections should be taken at the mean or average value as closely as it can be estimated, and this could never, of course, be the width of either its top or its bottom side, that is, its maximum or its minimum width.

This reasoning is also true in finding areas of indicator cards or for any general irregular area problem.

Our modern ships do not present the coal bunker problem. However, 43 cu. ft. per long ton of 2240 lbs. is the accepted figure. It varies from 42 to 45 for bituminous grades to 53 to 58 for anthracite grades.

QUESTION

When will you get around to diesel engines?

P.E.M., San Francisco.

ANSWER

Perhaps we have made a mistake in starting on boilers before diesel engines. Let the steam engineers write in their vote. If we get many more letters on this, we may be forced to break open the boiler series and present diesels.

For the present we will reply to all questions sent in on diesels. We present in this issue a resume of the boiler program ahead. Diesels as a general, continuing subject may have to wait a year before being presented.

Boiler Subjects

We present herewith a proposed program of subjects in order of presentation which will be covered on this subject. Letters and questions will guide the trend of subject matter.

(1) Fundamental Requirments of All Boilers
(2) How the Fundamentals Are Met
(3) Conventional Boiler Designs
(4) Unusual and Novel Boiler Designs
(5) Boiler Fittings
(6) Superheaters, Economizers and Air Preheaters
(7) Boiler Auxiliaries
(8) Furnaces, Combustion and Gas Analysis
(9) Efficiency and Capacity of Boilers—Ratings
(10) Liquid Fuels and Burners
(11) Automatic Boiler Controls
(12) Problems in Boiler Operation

Fundamental Requirements

QUESTION

What would be considered the cardinal points of boiler theory which good designs must account for by one means or another?

ANSWER

Many such lists have been prepared. The variation between authorities is principally on the matter of which points are fundamental and which points may be compromised to gain reductions in costs, weights or improvements in efficiency.

Boilers, like all other units of equipment, are a compromise in designs. For instance, we could save weight by using higher tensile strength steel, but we lose in ductility and resistance to shock stress. We could gain slightly in efficiency by increasing some dimensions and areas, but we increase weight and cost all out of proportion to the gain.

The writer would list the following as cardinal points:

(1) A surface large in proportion to other areas must be provided for the steam bubbles to break loose from the water to prevent carry-over.

(2) A constant and thorough circulation of the water over all heating surfaces must be assured, to maintain uniform temperatures.

(3) A combustion chamber so arranged in volume and shape that combustion is complete before gas

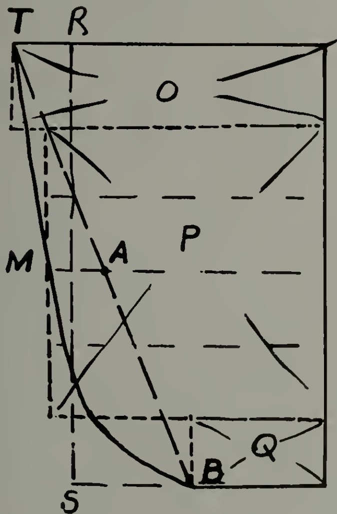


Fig. 1.

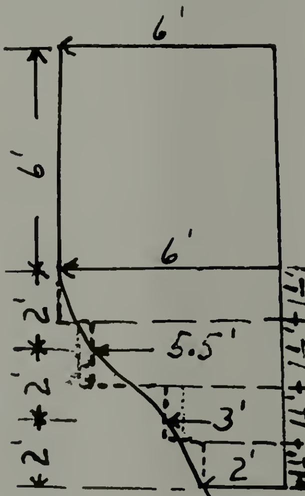


Fig. 2

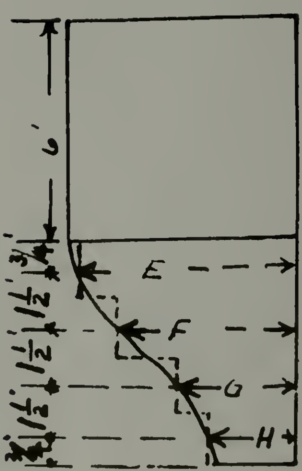


Fig. 3.

temperature is lowered by the heating surfaces.

(4) Heating surface broken up into many small sections so that unit stresses are reduced and result of failure on one section will not result in explosive effects.

(5) A mud drum to receive all sediment and precipitates and lead to adequate blow-down.

(6) Proper selection of tested and certified materials used in stress members. Parts put together with machined fits and no residual stress. Simple and accessible construction.

(7) A large safety factor in stress calculations. Expansion strains relieved by designed movement. Skillful design.

(8) Accessibility of parts for cleaning.

(9) Directed passage of gases through heating surfaces.

(10) Suitably rated for its load and suitably designed for its rating.

(11) Suitable and reliable fittings and gages.

Engineers' Licenses for July

Name and Grade	Class	Condition
SEATTLE		
C. G. Ralls, 3d Asst.	MS, any GT	O
SAN FRANCISCO		
W. T. Blow, Chief	SS, any GT	RG
W. A. Ferron, Chief	SS, any GT	RG
M. E. Lewis, Chief	SS, any GT	RG
L. F. Sellers, Chief	SS, any GT	RG
R. J. MacKay, Chief	SS, any GT	RG
F. J. Petersen, Chief	SS, any GT	RG
J. R. O'Neil, Chief	SS, any GT	RG
E. C. Stoner, Chief	SS, any GT	RG
E. Trebilcock, 1st Asst.	SS, any GT	RG
H. C. Boehner, 1st Asst.	SS, any GT	RG
W. M. Jones, 2nd Asst.	SS, any GT	RG
J. K. Taylor, 2nd Asst.	SS, any GT	RG
D. H. Donaldson, Jr., 2nd Asst.	SS, any GT	RG
D. B. Bivin, 2nd Asst.	SS, any GT	RG
G. Cobb, 2nd Asst.	SS, any GT	O
C. E. Anderson, 2nd Asst.	SS, any GT	O
J. L. Colton, 2nd Asst.	SS, any GT	O
E. Barish, 3d Asst.	SS, any GT	O
J. F. Von Barm, 3d Asst.	SS, any GT	O
PORTLAND		
E. I. Hantak, Chief	MS, 750 GT	RG
1st Asst.	MS, any GT	
SAN PEDRO		
R. E. Moody, Chief	SS, any GT	RG
H. L. May, 3d Asst.	SS, any GT	O
C. L. Sorensen, 3d Asst.	SS, any GT	O
D. L. Byrd, Chief	MS, 750 GT	O
G. S. A. Goltz, Chief	MS, 750 GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

Our next article will discuss some of the theory and mechanics behind the successful fulfilling of the above requirements.

Book Reviews and Trade Literature

Modern Export Packing, by Joseph Leeming; 530 6" x 9" pages; 242 illustrations; bound in buff buckrum with black stampings; published by the Bureau of Foreign and Domestic Commerce of the U. S. Department of Commerce; for sale by the Superintendent of Documents, Washington, D. C.; price $1.00, net.

Here is a very timely and interesting volume filled with the type of information that every exporter, every shipping executive, every stevedore and every deck officer needs in the handling of export cargoes. It is a new, up-to-date edition of the book *Packing for Foreign Markets*, published by the Bureau in 1924 and very widely distributed and used.

The text is divided into three main sections and an appendix. The first 140 pages describe the construction of containers in great detail. This section, carefully studied, would enable any person of ordinary intelligence to qualify as an expert inspector of containers for export packing. Two hundred and eighty-seven pages on "Packing Methods for Commodity Groups" compose the next section. Number three section has fifty-four pages on the subject "Vital Considerations Affecting Satisfactory Packing." Finally, the appendix lists quite comprehensively "Conditions and Facilities at Ports Throughout the World."

A good book to have on the shelves for leisure study and for reference. Worth far more than the price.

German Subs in Yankee Waters, by Henry J. James; 210 pages illustrated with numerous pen-and-ink sketches by Charles E. Pont. Published by Gotham House, New York; price $3.00, net.

This is the story of the transatlantic cruises of German U-boats during the first world war, and of the captures and sinkings they effected in the shipping lanes along the Atlantic Coast of the United States. It is brought out at this time with the intention of boosting national defense measures, and that intention has our hearty endorsement.

Henry J. James is an educator and a veteran Sea Scout. He is Superintendent of Schools at Simsbury, Conn., and chairman of Sea Scouting in that state. During the time covered by his book he was serving (age 15) as a sailor in the Provincetown fleet of fishing vessels. His father was owner and operator of a Grand Banks fishing schooner. He has put a lot of this background, and of research on German submarine logs and diaries, into the making of this book, an authentic addition, to our knowledge, of an important, little-known chapter in American history.

Flame-Hardening Apparatus, a new 12-page bulletin issued by the Air Reduction Company.

This booklet makes available to the metal-working industry details on the considerations and apparatus involved in flame-hardening surfaces of various forms. It describes specifically the Airco Style 4383 water-cooled flame-hardening torch, and the variety of extensions and types of tips available for use with it. It includes special equipment, such as torch holder, adjusting arm and use of the Airco No. 4 Radiagraph, a portable machine especially serviceable for mounting the flame-hardening torch.

Cut Steel Profitably With Kennametal Tools and Blanks is the title of a new six-page folder published by McKenna Metals Co. and describing how Kennametal is manufactured, where it can be used and why it is said to be the best tool material for machining steel of all hardnesses up to 550 Brinell.

This new folder contains complete factual data on this new hard carbide tool material, yet can be easily read in fifteen minutes. Three tables describe (1) the comparative physical properties of Kennametal; (2) materials machined with Kennametal; and (3) recommended speeds for machining steels of various hardnesses.

A chart on page 4 demonstrates the increased cutting speeds and greater hardness range of steels machined with Kennametal, as compared to cobalt chrome alloys and high-speed steels. Illustrations show typical turning, milling and shaping operations employing Kennametal-tipped tools.

Copies of Bulletin 740 will be sent free to those requesting it on their company letterhead.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Cargo and Stowage

III SOME SPECIAL CARGOES

QUESTION

What is meant by the term "stowage?"

ANSWER

Stowage is that important branch of the art of seamanship which applies to the loading of a vessel, and has for its aims the handling, placing and packing of goods in a vessel in such a manner as will best ensure the following:

(1) The preservation of crew and ship from danger or injury arising from the manner in which the cargo is stowed.

(2) To protect the cargo from damage, loss or deterioration, and so ensure "sound delivery" of same.

(3) The economy of cargo space, on which depends the vessel's earning capacity.

(4) The highest possible rate or port speed, i.e., the rate at which a vessel is capable of loading or discharging her cargo.

QUESTION

What is meant by "port-marking" cargo, and how would you do this?

ANSWER

Cargo loaded for several ports should be port-marked if possible. This is usually accomplished by allotting a certain color to each discharging port, and it is customary to either chalk or paint this color on the cargo for the corresponding port.

QUESTION

What is "broken stowage," and where does this occur?

ANSWER

The term "broken stowage" is space which is lost and unoccupied by cargo between and around packages in stowage, and is made up of the spaces between individual packages; space occupied by dunnage; space at sides, ends and on top of cargo; also in way of pillars, brackets, bulkhead stiffeners, etc., which is not sufficiently large to receive the size of package available.

QUESTION

What is meant by the term "acids," and where would you stow them?

ANSWER

To the popular mind, the name "acid" suggests something in which danger lurks and which must be treated with the utmost precaution.

It by no means follows, however, that because a substance is labeled "acid" it must necessarily be "dangerous." Many acids are perfectly harmless; some, indeed, are foodstuffs.

Acids may be solid, liquid or gaseous.

Solid acids would usually be packed in drums or cases, more often well waxed, and must be kept dry. The containers should be carefully inspected, for if water reaches the acid and the container is in any way faulty, leakage and damage must be expected.

Liquid acids would generally be shipped in carboys. These carboys should be surrounded with some antiacid material, i.e., chalk, and securely packed in an iron crate. Such cargo should be carried on deck "At Shipper's Risk," and, provided the containers are efficiently lashed, there need be little cause for anxiety. If, however, accident should happen, the defective articles should be thrown overboard.

Gaseous acids would be contained in cylinders. These cylinders should be wrapped in rope and then stowed in the coolest part of the vessel. Gas cylinders must always be tightly wedged to prevent movement during transit, for collision between

Deck Officers' Licenses

Name and Grade	Class	Condition
SEATTLE		
J. Nilsen, 2nd Mate	SS, any GT	RG
SAN FRANCISCO		
S. C. Krolikowski, Master	SS and MS, any GT	RG
R. Hall, Chief	SS, any GT	RG
G. H. Blackett, Chief	SS, any GT	RG
J. M. Hansen, Chief	SS, any GT	RG
E. H. Dovey, Chief	SS, any GT	RG
T. Westerling, Chief	SS, any GT	RG
G. W. Jahn, 2nd Mate	SS, any GT	RG
H. E. Goode, 2nd Mate	SS, any GT	RG
G. C. Marshall, 2nd Mate	SS, any GT	O
H. G. Oliver, 3d Mate	SS, any GT	O
J. M. Windas, 3d Mate	SS, any GT	O
T. E. Edwards, 3d Mate	SS, any GT	O
W. F. Redfield, 3d Mate	SS, any GT	O
PORTLAND		
J. E. Bullock, Master	SS, any GT	RG
SAN PEDRO		
A. H. Larson, Chief	SS, any GT	RG
C. J. Robertson, 2nd Mate	SS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

themselves, or between them and the parts of the vessel, may cause the container to burst, especially so if the temperature has changed considerably, as in the tropics.

QUESTION

What care should be taken in stowing airplanes?

ANSWER

Airplanes are usually dismantled before shipment, the lighter parts, such as wings, fuselage, etc., being packed in large, light cases. Great care must be taken in handling them, especially when slinging, and the cases should always be slung where marked. Particular attention is necessary in the stowage, as it is absolutely essential that the cases should be stowed on a perfectly level foundation with numerous beds; otherwise, even with their own weight, cases will become broken or distorted, which usually results in damage to the contents. No heavy cargo should on any account be stowed above them; they should be first well boarded over.

QUESTION

What is ambergris, and where would you stow it?

ANSWER

Ambergris is a solid, inflammable, fragrant substance found on the coasts of or floating on the sea around India, Africa, Brazil, etc.; sometimes referred to as "grey amber." Used in perfume manufacture and is a very valuable article. Stow in strong-room; it is shipped only in small quantities.

QUESTION

What care should be taken in stowing aniline dyes?

ANSWER

A by-product of coal-tar, which emits fumes of a very dangerous character. Generally shipped either as oil in drums or crystals in casks. The oil fumes are very penetrating, and taint goods stowed with or near this cargo; furthermore, the oil leaves damaging stains on whatever it contacts with. Ships have been put to very great expense in freeing holds of the taint of aniline oil, entire compartments having had to be scrubbed with soap and water. Stow in poop, or forecastle, away from foodstuffs and crew's quarters, and well removed from bleaching powder, as the mixture of their gases is dangerous.

QUESTION

Is any special stowage required for antimony?

ANSWER

This is a metal that is a chemical element. It is variously shipped as antimony oxide, salts and sulphide, which latter is used in vulcanizing rubber. Antimony oxide is shipped in casks, and is much used as a substitute for paint. The ore is sometimes carried in bulk, but usually in casks, boxes and bags. If carried in bags, they must be carefully examined to see that they are not damaged. No special stowage is required, but all are poisonous and should be stowed clear of foodstuffs.

QUESTION

Where would you stow areca nuts, and what would you particularly guard against?

ANSWER

They are the "betel nuts" of the tropics, obtained from the areca cathecu palm. The natives use it mixed with pan leaf and chunam or lime as a masticator. This, like almost all other nut cargoes, is very much given to heating, a case having been known where the temperature of the hold was raised to the extent of 40° through this cause. When green and shipped in baskets or bags on long passages, damage is often caused to other articles by its heating properties, and it also gives off a dangerous gas fatal to animal life. If at all damp or wet, they should be rejected, as they are totally unfit for shipment in that condition.

Stow away from boilers, clear of all cargo liable to be affected by humid heat. Keep the hatches uncovered as much as possible, as good ventilation is a first essential to their proper carriage.

The nuts lose weight up to about 10 per cent on long passages.

QUESTION

Where is asphalt obtained, and how is it carried aboard ship as cargo?

ANSWER

Native asphalt is a mineral resin formed by the natural drying up of rock oil or petroleum in its bed, deposits of which are found in Trinidad, where it is obtained from a "lake" of about 100 acres in extent, the supply appearing to be inexhaustible; deposits are also found in Cuba, Venezuela, Peru and various places in the Gulf of Mexico.

Asphalt is also obtained from petroleum by distillation.

It is used principally as a paving material, and is shipped in bulk, in open- or single-headed barrels, and sometimes in drums or ordinary barrels.

For bulk shipments, holds are usually lined, otherwise the asphalt forms around and adheres to frames, stringers and plating in such manner that it is very difficult to clean off. The lining and other parts with which the asphalt will come into contact sometimes are smeared over with soft clay or mud to prevent the asphalt sticking to same; whitewash, sometimes applied, is not as effective as clay, and care should be observed to prevent the asphalt oozing into the bilges, etc. Shifting boards are necessary for bulk cargo.

The asphalt, when shipped, is in a soft plastic condition, and remains so during the tropical part of the voyage, hardening as temperature falls, making the discharge very slow and laborious work, involving the use of pickaxes, etc.

Should a vessel laden with asphalt in bulk take a list, the tendency would be for such to increase as the plastic mass settled to the low side. On modern vessels, such a tendency can, however, easily be corrected by the timely use of trimming tanks.

When shipped in barrels, it is advisable to stow them on end and put loose dunnage between them. If carried below decks, stow in a cool place and away from goods liable to be affected by the smells thrown off. Packed this way, it is often carried as deck cargo. In some forms asphalt is inflammable.

QUESTION

Where should a part cargo of automobiles in cases be stowed?

ANSWER

Automobiles shipped in cases should be stowed in holds having the largest "square" spaces, to avoid broken stowage. Care should be taken to see that they are stowed on a flat surface on level beds to prevent distortion of the cases, which often occasions serious damage to the automobiles they contain. If stowed in large numbers, boards should be laid between each tier, so as to distribute the weight of each

case over more than one case beneath it. Light cases or other goods may be stowed on top of these cases, but if broken stowage is needed between cases, great care should be exercised as to what cargo is used for this purpose, and only strong cases, lumber or similar goods should be employed. Serious damage has often been caused to light goods which have been used for this purpose, and heavy claims resulted.

QUESTION

How would you stow a part cargo of bark?

ANSWER

There are many kinds carried, and they are shipped in bulk, bales, bags and sometimes hogsheads. They may generally be stowed with dry goods when free from smell or insect life. Stow well away from articles of an edible nature. The finer kind of bark should be kept away from oily, damp or strong-smelling articles, as it may be damaged by contact. Hemlock bark requires to be well protected from rain or wet, as it is easily damaged. All barks should be protected from salt water.

QUESTION

What care should be taken when stowing beans, bean oil and bean cake?

ANSWER

There are many kinds of beans, such as haricot, butter, locust, etc. They are usually shipped in bags, which should be well dunnaged and matted, and given good dry stowage away from any goods such as turpentine, oil, etc., from which they would be liable to be damaged by taint.

Bean oil is shipped in considerable quantities from Japan, Manchuria, China, New Orleans, etc. In many cases this oil is now shipped in bulk. It solidifies at about 10 degrees F. It is also shipped in barrels.

The cases are sometimes tied with straw cord, which renders good firm stowage impossible; the cross hitch at the top and bottom pierces the cases above and below under pressure. If the roping is cut off, the cases will stow much firmer, with consequent less leakage. Leakage of this oil, whether in barrels or cases, is very considerable, and great care should be taken, by suitable boarding over, to keep other cargo from getting into contact with the oil containers.

Bean cake is an oil cake, and should have dry stowage, well dunnaged and guarded against tainting by other cargo. Do not stow on newly-sawed lumber, and reject damp packages.

QUESTION

What particular stowage is required for bleaching powder, and what should you guard against?

ANSWER

Bleaching powder (chloride of lime, sodium and potash) is packed in iron or steel drums, which are very liable to be destroyed by the bleaching powder. A strong disinfectant and deodorant white powder, it throws off corrosive pungent fumes (chlorine gas), which attack and destroy textile fabrics stowed in same compartment. The fumes, when allowed to accumulate, make it impossible for men to work in the compartment.

The most suitable stowage is on deck, or in poop, or forecastle, well clear of crew's quarters. If stowed below, stow near but not on hatchway, in a well-ventilated compartment which contains no delicate or textile goods.

QUESTION

Where would you stow bones and bone meal?

ANSWER

Bones are shipped in cases, bags, and also loose. They are often carried at a reduced freight rate and used for broken stowage and filling into places such as peaks, tanks and behind cargo battens, etc. If stowed in compartments with other cargo liable to be damaged by taint or moisture, it should be ascertained if they are perfectly dry and sweet, otherwise damage may occur by overheating, or the odor may contaminate other cargo.

Bone meal is a preparation from bones; it is usually shipped in bags, has a slight odor and also creates a great dust over nearby goods when loading or discharging. If the bags are inferior or second-hand, the bill of lading should be so endorsed. In discharging, the bags should be carefully handled, as they rot very easily on the passage, and are often found burst, allowing the loose bone dust to mix with other cargo. Stow as for ordinary bag cargo, and ventilate as much as possible.

QUESTION

What special care should be taken while loading bullion? By what agreement is it usually carried and where stowed?

ANSWER

Gold and silver bullion, i.e., uncoined gold and silver, respectively, is shipped in ingot or bar form, packed in strong, well-made boxes, which usually are fitted with strong rope beckets for handling; very rarely is bullion shipped in large ingots unboxed. Unless vessel is fitted with a proper strong-room or safe of suitable capacity, bullion should not be received on board.

Cases containing bullion should always be worked with nets especially constructed for this purpose, and each net should be fitted with a buoy rope long enough to reach the bottom of the dock, or place where the vessel is lying, in case of accident. This buoy rope must be rove round the edge of the net, and spliced with an eye splice around its own part. It is obvious that should an accident occur when hoisting a net of bullion on board, and the fall break and allow the contents to sink in the water, if the buoy rope was not rove as described, the net would open under water. Whereas if so fitted, and a strain be put on the buoy rope, the net would close.

Bullion is usually carried nowadays by special agreement only, that is to say, on a percentage based on the declared value, and must be carried in a strong-room or other locked-up accommodation.

Each operation of receiving, stowing and delivering this valuable cargo should be personally supervised by the ship's officers, assisted, when necessary, by responsible members of the shore staff. An officer should tally bullion at the rail, and its progress to the bullion room should be carefully watched. Tally and check again in bullion room before stowing, recording every mark and number, also examining the seals.

Delivery should never be made by ships' officers to anyone except on an order from master, owners or agents, the order clearly specifying marks and numbers to be delivered.

On the Ways — SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Bethlehem Launches S. S. James Lykes at Sparrows Point Yard

An important addition was made to the rapidly-growing American merchant fleet when the S.S. James Lykes was launched on July 27 at the Sparrows Point (Maryland) Yard of the Bethlehem Steel Company, Shipbuilding Division. The new vessel, the keel of which was laid on January 16, is of the United States Maritime Commission's C1-B type. It is the first of five vessels of this type under construction at the Sparrows Point Yard for Lykes Brothers Steamship Company of Houston, Texas. Mrs. James M. Lykes, whose husband is vice president in charge of the company's Galveston office, was the sponsor at the launching.

The James Lykes has a deadweight capacity of 9075 tons, a displacement of 12,875 tons and a cargo carrying capacity of 7,786 tons. Accommodations are also provided for eight passengers. The principal dimensions are as follows:

Length overall	416 ft. 0 in.
Length between perpendiculars	395 ft. 0 in.
Breadth	60 ft.
Depth to main deck	37 ft. 6 in.
Draft	27 ft. 6 in.
Speed	14 knots

The propulsion machinery consists of a Bethlehem cross-compound, double reduction gear turbine of 4000 shaft horsepower, driving a single four-blade propeller. Two water-tube boilers burning oil under forced draft will supply steam at 450 lbs. per square inch pressure at a temperature of 750 deg. F. at superheater outlets. Electric energy will be supplied by two 250-k.w. turbo generators, with a 15-k.w. diesel-operated unit supplying power in emergencies. Normally the vessel will carry 879 tons of fuel oil, sufficient for 10,000 miles radius at 14 knots.

Priority in C-1 Launchings

A great deal of confusion has been caused by the statement printed in *Pacific Marine Review* and in the daily press that the August 1 launching of a C-1 cargo vessel at the Tacoma yards of the Seattle - Tacoma Shipbuilding Corporation was "the first launching of a C-1 type ship." This should have read, "first on the Pacific Coast."

The first five launchings of C-1 type cargo vessels came very close together, in the following order:

No. 1. James Lykes, built by Sparrows Point, Bethlehem, at Sparrows Point, Maryland; July 27.

No. 2. Cape Alva, built by Seattle-Tacoma Shipbuilding Corp. at Tacoma; August 1.

No. 3. Joseph Lykes, built by Federal Shipbuilding and Dry Dock Co. at Kearny, N. J.; August 3.

No. 4. Cape San Martin, built by Union Plant of Bethlehem, San Francisco; August 6.

No. 5. American Manufacturer, built by Western Pipe and Steel Co., South San Francisco; August 8.

Navy Awards On Pacific Coast

During the past two months, the U. S. Navy has awarded contracts for shipbuilding aggregating in excess of $55,000,000 to naval and private yards. These include:

Puget Sound Navy Yard—2 destroyers.

Mare Island Navy Yard—1 sub. tender and 4 subs.

Union Plant, Bethlehem—2 destroyers.

General Engineering & Dry Dock Co.—4 anti-sub. net tenders.

Commercial Iron Works—4 anti-sub. net tenders.

STATUS OF UNITED STATES MARITIME COMMISSION SHIPBUILDING PROGRAM

AS OF AUGUST 1ST, 1940

TYPE OF VESSEL AND PROPELLING MACHINERY	CONTRACTS AWARDED — Total		Steam Propelled			Diesel Propelled			KEELS LAID		LAUNCHED		DELIVERED	
	No.	Gross Tons*	No.	Gross Tons*	Horse-power*	No.	Gross Tons*	Horse-power*	No.	Gross Tons*	No.	Gross Tons*	No.	Gross Tons
Passenger—United States Lines Turbine (H. P. — D. R. gear / I.P. & L.P.—S. R. gear) Twin screw	1	26,454	1	26,454	37,400	—	—	—	1	26,454	1	26,454	1	26,454
Passenger and Cargo—Mississippi Shipping Co. Turbine—D. R. gear—Single screw	6	49,477	6	49,477	51,600	—	—	—	3	24,577	3	24,577	1	7,977
Passenger and Cargo — C-3	15	133,100	11	96,300	93,500	4	36,800	34,000	10	91 100	1	9,300	—	—
Turbine—D. R. gear—Single screw	11	96,300	11	96,300	93,500	—	—	—	6	54,300	1	9,300	—	—
Diesel—geared drive—4 engines—Single screw	4	36,800	—	—	—	4	36,800	34,000	4	36,800	—	—	—	—
Cargo—C-3	18	140,636	14	109,092	121,550	4	31,544	35,600	18	140,636	13	101,636	9	70,436
Turbine—D. R. gear—Single screw	14	109,092	14	109,092	121,550	—	—	—	14	109,092	9	70,092	5	38,892
Diesel—geared drive—4 engines—Single screw	4	31,544	—	—	—	4	31,544	35,600	4	31,544	4	31,544	4	31,544
Cargo—C-2	40	254,899	18	119,045	112,200	22	135,854	132,000	20	132,327	18	119,939	17	113,745
Turbine—D. R. gear—Single screw	18	119,045	18	119,045	112,200	—	—	—	10	70,365	10	70,365	10	70,365
Diesel direct drive—Single screw	14	86,302	—	—	—	14	86,302	84,000	10	61,962	8	49,574	7	43,380
Diesel—geared drive—2 engines—Single screw	8	49,552	—	—	—	8	49,552	48,000	1	6,085	—	—	—	—
Cargo—C-1-A	4	20,112	2	10,056	8,000	2	10,056	8,000	2	10,056	—	—	—	—
Turbine—D. R. gear—Single screw	2	10,056	2	10,056	8,000	—	—	—	1	5,028	—	—	—	—
Diesel—geared drive—2 engines—Single screw	2	10,056	—	—	—	2	10,056	8,000	1	5,028	—	—	—	—
Cargo—C-1-B	34	229,500	24	162,000	96,000	10	67,500	40,000	19	128,250	1	6,750	—	—
Turbine—D. R. gear—Single screw	24	162,000	24	162,000	96,000	—	—	—	15	101,250	1	6,750	—	—
Diesel—geared drive—2 engines—Single screw	10	67,500	—	—	—	10	67,500	40,000	4	27,000	—	—	—	—
Cargo—American Export Lines, Inc. Turbine—D. R. gear—Single screw	12	78,544	12	78,544	97,200	—	—	—	8	53,744	5	33,644	4	26,944
Cargo—Seas Shipping Company Turbine—D. R. gear—Single screw	6	51,000	6	51,000	37,800	—	—	—	3	25,500	—	—	—	—
Tankers	23	247,122	23	247,122	314,400	—	—	—	12	136,922	11	125,422	10	113,922
Turbine—D. R. gear Twin screw	12	136,922	12	136,922	182,400	—	—	—	12	136,922	11	125,422	10	113,922
Turbine—D. R. gear Single screw	11	110,200	11	110,200	132,000	—	—	—	—	—	—	—	—	—
GRAND TOTAL	159	1,230,844	117	949,090	969,650	42	281,754	249,600	97	775,651	53	447,722	42	359,478

* Estimated

(Reproduced from "The Bulletin," American Bureau of Shipping)

Lake Washington Shipyards—4 anti-sub. net tenders.

Enterprise Engine Company — Power plants for 12 A.S.N. tenders.

This is just a beginning. Well-authenticated rumor avers that the Navy Department has a large number of destroyers, tenders, submarines and several naval auxiliary types allocated for Pacific Coast construction. The extension of erecting and fabricating facilities in several Coast yards strengthens this rumor.

In addition to new construction, the Navy plans call for the purchase of a number of vessels for conversion into transports and Navy supply ships. Instances already accomplished along this line are: The purchase of Sea Arrow and large alteration job contracted for with her builders, the Moore Dry Dock Co.; and the purchase of two old American Mail Line vessels, S.S. President Grant and S.S. President Jackson, and their conversion into Navy transports at a total cost of approximately $4,000,000.

Pacific Coast shipyards are busy now, and will be busier.

Moore C-3s to Moore-McCormack

In keeping with his promise, made early in May, that Moore-McCormack Lines would take an important part in Pacific Coast shipping, A. V. Moore, president, on the eve of his second inspection tour to the Coast, announced that his company had acquired from the Maritime Commission the second, third and fourth C-3 type cargo and passenger vessels, now building at the Moore Dry Dock Company in Oakland. In releasing his statement, Mr. Moore said: "We have had our eyes on these ships from the very start, and knowing the high quality of workmanship at the Moore yard, we lost no time in opening negotiations with the Maritime Commission, and we are indeed very happy to have these fine vessels in our fleet."

The two vessels, already launched, and christened Sea Star and Sea Panther, will be renamed Mormacsea and Mormacstar, and will enter the service of Moore-McCormack on October 30, 1940, and January 15, 1941.

Coincident with Mr. Moore's announcement, Commander K. H. Donavin stated that the company had selected Miss Carlota Sepulveda Chapman of Los Angeles as the sponsor at the launching of the third vessel, which will be christened Mormacsun on August 28. Because she is a descendent of distinguished Spanish forbears, long identified with the development of the Far West, her selection is intended as a good neighborly tribute to the various Latin-American countries served by Moore-McCormack. Miss Chapman is the daughter of the ever-popular Conchita Sepulveda, now the Princess Pignatelli. Her grandfather was the late Superior Judge Ygnacio Sepulveda, and her grandmother was Erlinda de la Guerra of Santa Barbara.

The Mormacsun will enter service on March 1, 1941.

Federal Delivers 4 in One Month

The Kearny yard of the Federal Shipbuilding and Dry Dock Company made quite a record in July by delivering:

One torpedo boat destroyer.

One C-3 cargo vessel.

Two tankers.

The destroyer is the U.S.S. Plunkett, launched, together with her sister, U.S.S. Kearny, on March 9, 1940.

The cargo ship is the Almeria Lykes, fourth of six C-3 cargo vessels built for the U. S. Maritime Commission. She was allocated by the Commission to the Lykes Bros. Steamship Company of New Orleans.

The tankers are S.S. Esso Montpelier and S.S. Esso Concord, both for the Standard Oil Company of New Jersey.

Federal launched the C-3 cargo ship Howell Lykes on July 13 and the C-1 cargo ship Joseph Lykes on August 3.

This leaves the Kearny yard with a nice long list of work on hand, as follows:

For the U. S. Navy: four torpedo boat destroyers, two on the ways and two at the outfitting dock; two six-thousand-ton cruisers, both on the ways.

For the Maritime Commission: three C-3 cargo vessels, two at the outfitting dock and one on the ways; five C-1 cargo vessels, four on the ways and keel for one not yet laid; and eight C-2 cargo vessels, with no keels laid yet.

For private owners: two cargo vessels for Matson Navigation Company, keels not laid; one tanker for Standard Oil of New Jersey, almost finished; one tanker for Pan American Petroleum and Transport Co., keel not laid; and four tankers for Sinclair Refining Co., keels not laid.

On top of all this, the U. S. Navy has awarded to Federal orders for 12 destroyers.

Bushey Building Diesel Tugs

Ira S. Bushey & Sons, Inc., Brooklyn, N. Y., report orders for several diesel tugs, all to be fitted with Fairbanks Morse diesel engines. These include:

Two tugs 82 feet long, each powered with 575 bhp engine.

Two tugs 77 feet long, each powered with a 450 bhp engine.

One tug 90 feet long with an 805 bhp engine.

One tug 100 feet long with an 805 bhp engine.

This yard also has a contract to build a new section for a wood construction floating drydock.

Newport News Delivers America

On July 2 the Newport News Shipbuilding and Drydock Co. delivered the express passenger liner America to the United States Lines. This ship, 723 feet long, 92 feet beam, and with a depth of 45 feet, is the largest and most elaborately-equipped vessel yet built in an American shipyard. On her trials she exceeded all guarantees as to speed, economy and maneuverability.

On June 21 a big tanker was delivered to the Standard Oil Company of New Jersey.

On hand at Newport News are:

The battleship Indiana, the aircraft carrier Hornet and an order for three aircraft carriers and two cruisers, all for the U. S. Navy.

Seven combination passenger and cargo C-3 vessels for the U. S. Maritime Commission.

One oil tanker for Standard Oil Company of New Jersey.

Two cargo vessels for Matson Navigation Company of San Francisco.

One cargo vessel for International Freighting Corporation.

The unfinished work and orders on hand at Newport News approximate $300,000,000.

Mathis Reports New Contracts

The John H. Mathis Co. of Camden, New Jersey, report that they have been allotted four anti-submarine net tenders by the U. S. Navy.

Working for an undisclosed client, Thomas Bowes, naval architect of Philadelphia, has contracted with the Mathis yard to build an especially-designed tanker 275 feet in length and equipped to handle bulk cargoes as well as oils.

Literature of the Industry

Recommended Practice for Electrical Installations on Shipboard—98 pages 8" x 11"; bound in stiff blue paper with black stampings; published by the American Institute of Electrical Engineers. Price $1.50, net.

This is a new, fully-revised 1940 edition of A.I.E.E. Standard No. 45, and incorporates the numerous changes that have occurred in every department of marine electrical design.

The Rules have been brought into line with best practice. They utilize new developments in electrical equipment, and eliminate confusion by clarifying terms and definitions. Some of the broader changes concern specifications for three-wire, grounded neutral, direct-current systems; recommendations for the use of nickel-alkaline batteries; a more complete description of direct-current and alternating-current motor and control practice and changes to simplify the sections on radio, fire alarm systems and signal communication systems.

The regulations and specifications contained in this pamphlet serve as an invaluable guide to those bidding on various marine electrical equipment or engaged in installation. These "Marine Rules," as they were formerly called, are fully coordinated with governing regulations and are recognized as the guide to accepted practice.

High-Capacity High-Pressure Drainage, Publication 2935 of the Cochrane Corporation, describes and illustrates the Cochrane Discharger, which is essentially a positive acting trap of specialized design to handle large quantities of condensate or carry-over at relatively high pressures.

At high differential pressures, the drainage of large quantities of con-

densate or boiler carry-over presents a problem to usual types of drainage equipment. To insure tightness, an unbalanced valve must be used. At the same time the discharge orifice must be large enough to drain slugs of water rapidly from steam purifiers or dry steam drums of priming boilers.

High operating power, unrestricted by pressure-capacity relationships, is the ideal solution. The Cochrane Discharger, by means of a pilot valve, applies the steam line pressure to open the discharge valve. Displacement weights of different densities move the pilot control valve. When the pilot valve has opened, steam is admitted to the top of the main valve piston, opening the discharge valve. Drains are discharged from the bottom of the body through the eduction pipe to the outlet. Pilot-control, together with independence of prime, are advantageous factors, particularly in conjunction with pulsating pressures.

Typical applications to boiler dry drums, steam purifiers and separators, and steam mains, are described, and the bulletin contains: capacity table; dimensional data and prices; and complete operating information.

A Pacific Coast Forecast

Every twelfth longshoreman hurt on Puget Sound this year is going to be hit by a moving slingload.

Every eleventh San Francisco longshoreman who needs first aid in 1940 is going to be suffering from a sprained back.

Every twentieth longshoreman at Los Angeles Harbor who is injured this year is going to be hurt because someone's hand hook slipped or missed.

Every eleventh Columbia River longshoreman who reports an accident to his foreman in 1940 is going to do so because he mishandled some sharp or rough object.

How can such positive statements be made? Is it because safety engineers are gifted with second sight? Do they run to soothsayers and astrologers? No, nothing so startling or unreliable as that. We merely looked at the record of the past, and from that can determine with relative certainty what the future holds. We can't quite tell on what day an accident will happen, but we can point out that after so many hours are worked in a given port an accident is due. If it doesn't happen at just that moment, it is just d e l a y e d — not necessarily avoided.

If supervisors will only remember that it is much more effective to caution men against unsafe habits and practices before an accident than it is to "bawl" them out afterwards, then perhaps they can avoid fulfilling the forecast made above.

[August Stevedores' Safety Guide]

Safety

Aboard Ship and on the Docks

By M. McKinstry

Assistant Manager, Alaska Steamship Company

Shipping always has been, and still is, a hazardous industry—hazardous from the point of view of investment, as well as hazardous for the men who load and discharge the ships, and for the men who go down to the sea in ships.

Many steamship companies separate their ship operations from the stevedoring or cargo handling operations, turning the latter over to contracting stevedoring companies who are equipped and organized to load and discharge all the many types of cargo that are shipped by water. Some companies, such as the Alaska Steamship Company, however, perform their own stevedoring operations.

Workmen's compensation for longshoremen working ashore, that is, on the docks, in the State of Washington is provided under the State Workmen's Compensation Act. Longshoremen employed aboard ship, or on barges or rafts, are covered under the Federal Longshoremen's and Harbor Workers' Act. The ships' personnel are not covered by any workmen's compensation act.

The employers' responsibility to provide reasonably safe working places and conditions is gladly assumed by steamship company and stevedore employers. On the United States Pacific Coast the employers have gone much farther and have set up an accident prevention bureau, with safety engineers in the principal ports, to develop and supervise a safety program covering both ship operations and cargo handling. Members of the Pacific American Steamship Association, the Shipowners' Association of the Pacific Coast, and the Waterfront Employers' Association are served by and participate in the program of this bureau.

Ships' Personnel Program

A safety program for a ships' personnel must of necessity be different from that for longshoremen, although both are based on well-recognized principles of safety. The crew and officers of a ship form a unit of organization that may be isolated for days or weeks at a time, with only infrequent contact with the shore organization. On the other hand, stevedoring operations, although largely performed aboard ship, are concentrated so far as a given group of men is concerned at a particular port.

For both ships' personnel and longshoremen's safety programs there are certain essential features, such as:

(1) The provision and maintenance of reasonably safe working places and conditions.

(2) The development and enforcement of safe working practices or methods.

(3) The training of the workmen in safe ways of work.

In order to insure these essential features, it is necessary to create and maintain interest in the benefits of accident prevention on the part of:

(a) Top executives.
(b) Superintendents.
(c) Ships' officers.
(d) Ships' crews.
(e) Stevedore foremen.
(f) Longshoremen.

And finally, rules and regulations for safe working places, safe working practices and methods and safe acts of workmen must be enforced.

In connection with the safety program for ships' personnel, the Accident Prevention Bureau, in cooperation with steamship company representatives, performs the following services:

(1) Holds joint meetings with the San Francisco company executives of the deck, engine and stewards' departments, at which policies and safe practices are discussed and determined.

(2) Makes personal contacts with steamship company heads of departments to discuss company problems.

(3) Furnishes each company with semi-annual and annual analyses of its reported crew and passenger accidents, including injury frequencies for deck, engine and stewards' departments, and reports showing uncontrolled conditions which resulted in accidental occurrences.

(4) Publishes the Seamen's Monthly Safety Guide, which is distributed to operating managers, department heads and vessels.

(5) Prepares ships' safety committee topics for each ship department, which are distributed to vessels through department heads.

(6) Prepares and distributes from time to time safe practice pamphlets for the deck, engine and stewards' departments.

(7) Special company studies and organization plans developed and submitted on request.

(8) Suggestions for ship safety committee meeting programs and special safety talks for masters are prepared upon request.

(9) All company ship safety committee meeting minutes are re-

viewed, studied and commented upon by the chief safety engineers.

(10) Masters, chief officers, chief engineers and first assistants are contacted by one or more members of the Bureau staff at frequent intervals, and accidents and accident prevention discussed.

(11) Special seamen safety posters are prepared and made available to each company.

(12) A safety award plan is administered, under which certificates and flags are awarded to each qualifying vessel, special certificates are presented annually to qualifying masters, and special certificates for meritorious companies are presented annually.

(13) Through a special ship construction safety committee, the Bureau has developed minimum standards for safe working and living conditions on new ships. A recent news release in this connection received national recognition.

Each steamship company participating in this program provides for safety committee meetings aboard ship for the discussion of accidents and accident prevention, for inspections of physical conditions and other safety activities. Naturally, the results obtained depend to a great extent upon the interest of the top executives in safety, which interest is reflected by the ships' officers. Steady and marked improvement is being made by some companies in the reduction of their accident frequency.

Stevedoring Operations

The problems connected with accident prevention in stevedoring operations are many and complicated. In addition to the inherent hazards of cargo handling operations, there are the added difficulties due to the work being done by men who are dispatched from union hiring halls on a rotation system and whose work from day to day involves different ships, different gear and different cargo, as well as different employers.

On the Pacific Coast the accident prevention program is administered by the Accident Prevention Bureau, with district safety engineers in San Pedro, San Francisco, Portland and Seattle, and with the chief safety engineer and office staff at San Francisco.

Daily inspections are made by the safety engineers of ships loading or discharging cargo at Pacific Coast ports, except that at the minor ports the inspections are made only occasionally. These inspections are made primarily for the purpose of checking up on ship and stevedore cargo handling gear to determine, so far as visual inspection will disclose, if the gear is adequate and safe. In addition, however, such inspection visits afford the safety engineers opportunity to observe and discuss with foremen and others unsafe methods or practices that may lead to accidental occurrences. It is also said that a safety engineer serves as a walking safety poster, calling attention by his mere presence to the general subject of safety.

Each of the four districts, Southern California, San Francisco, Columbia River and Puget Sound, has an active district safety committee, made up of stevedore executives. These committees meet monthly for consideration and discussion of operting problems connected with safety in handling cargo. Thereby they develop and agree upon many safe methods and practices which are generally adopted and put into use. Meetings of these committees also stimulate interest in safety.

Safety Dinners

It has been the practice on Puget Sound, and to less extent in the other districts, to hold general dinner safety meetings of stevedore and dock company foremen three or four times a year. At these meetings matters of interest are discussed, and attempt is made to present phases of the foremen's vital part in preventing accidents, not as a separate and distinct function, but as an essential part of good foremanship. These meetings, of course, have as their principal value the development of interest in safety on the part of the foremen. By bringing these men together for dinner at a club or first-class hotel, there is afforded an opportunity for them to renew pleasant personal contacts. These dinner meetings also serve in a small way to dignify their positions, something which needs very much to be done.

Accident Reports

Copies of all accident reports are sent to the district offices. In all cases except the very minor ones, these reports are checked back with foremen, and others involved, in order to determine the true pictures of the occurrences, and to develop means of prevention of similar accidents. These discussions by the safety engineers with the men on the job are valuable in developing interest in accident prevention and a sense of responsibility on the part of the foremen.

After the accidental occurrences have been investigated, every accident report is coded under the following headings.

Place of accident.
Nature of work.
Kind of cargo involved.
Type of package.
Age of injured longshoreman.
Type of accident.
Seriousness of injury.
Part of body injured.
Responsibility for non-prevention.
Means of prevention.

These coded reports are then used as the basis of semi-annual studies made in the San Francisco office for the industry as a whole and for individual companies. Certainly no branch of the shipping industry has ever before been studied in such detail for the purpose of determining where, how and why accidental injuries occur. Such information affords a foundation for a scientific approach to the accident prevention problem, and there appears to be no satisfactory substitute for such a factual foundation.

Longshoremen Interest?

The most difficult problem under present conditions is to interest the longshoremen in safety. Because of the disturbed labor relations, official contacts with the longshoremen for the discussion of problems of safety are almost impossible. Safety posters are used to call attention to unsafe practices, and occasional contacts with hatch tenders, winch drivers and individual longshoremen are utilized by the safety engineers to implant ideas of safety. The foremen should be the most effective teachers of safety, but due to certain labor conditions, they cannot accomplish as much as might be expected in this line. They are also handicapped by lack of training in foremanship.

To illustrate the need of interesting and training the longshoremen

in safety, it may be mentioned that about 60 per cent of all accidental injuries to longshoremen are ascribed to acts of workmen, as compared with 20 per cent to methods and practices, 13 per cent to working places and conditions, less than 1 per cent to gear failures, and slightly over 6 per cent to all others.

Stevedoring is one of the few modern industries in which men are put to work without any preliminary training or special instructions. Apparently they are just supposed to know instinctively how to perform the various operations and how to avoid the inherent hazards. It is, therefore, no wonder that the production is poor and the accidental injury frequency is high.

Safe Acts Manual

Work is under way by the Accident Prevention Bureau to develop a safe acts manual and various series of action pictures, accompanied by explanatory script, illustrating the proper and safe way of performing various stevedoring operations, such as loading lumber, pulp bales, scrap iron, piling or stowing cases and cartons of canned goods. These would be used with groups of foremen and, later, longshoremen, to assist in training them in the correct ways of working.

Enforcement of safety rules and regulations, as well as other rules and regulations, is a very difficult matter at the present time, and until such enforcement becomes possible, any accident prevention program will be seriously handicapped, and the results disappointing. In spite of difficulties, however, real progress is being made in the reduction of both frequency and severity of accidents to longshoremen. Notable progress is being made by employer companies where top management is really in earnest regarding safety, and where it is accepted that a well-planned and executed operation is not only safe but also economical.

(Paper read before First Pacific Northwest Regional Meeting of Marine Section, National Safety Council, June 13, 1940.)

A New Radio Telephone For Coastwise Vessels

A marine radio telephone of 25 watts output, designed especially for the "deep sea" yachtsman and for commercial ships plying coastal waters, has been announced by the Western Electric Company.

The new unit, known as the 226C, features crystal control on both receiver and transmitter, high intelligibility and semi-automatic operation.

Simplicity keynotes the new design. Installation involves connection only to antenna, ground and power supply. The compact cabinet lends itself to mounting on a bulkhead, shelf, a locker top or other convenient support. Only three control knobs appear on the panel, and the transmitter goes on the air at the pressure of a finger on the handset button. Anyone can make a call with the new unit without previous instruction, although, because it involves radio transmission, the law requires the presence aboard of a licensed operator.

Henry Dreyfus, famed industrial stylist, has achieved in the 226C a beauty of design in conservative modern convention that accentuates the luxury of any stateroom or bridge. Electroetching causes the chrome panel markings to stand out in sharp relief against a jet black background. The remainder of the unit is neutral gray.

A single control is provided in the 226C for shifting both the transmitter and receiver simultaneously to any one of four frequencies. Three of these may be utilized for ship-to-shore communication and the fourth reserved for ship-to-ship or coast guard. All controls are located on the front panel, where they may easily be reached.

The radio receiver is of the superheterodyne type, embodying the latest developments in circuit design.

The handset, too, is the most advanced type available today. When not in use, it rests on a small hanger on the side of the cabinet. Returning the handset to its hanger automatically prepares the receiver for the next incoming call. Additional telephone instruments may be installed at selected locations about the vessel. A built-in loudspeaker monitors incoming calls, if desired, and selective calling is optional.

The 226C operates from a source of 110 volts, 60 cycles, a.c., which may be supplied by a small, inexpensive rotary converter. Due to the variations in ship electric power supply systems, the converter is not included as part of the equipment. Converters are available to operate from 12, 32 or 110 volt d.c. ship power supply systems. With a source of a.c. supply thus available on the boat, a standard broadcast radio receiver also may be operated, should the owner wish to receive broadcast programs.

PACIFIC MARINE

Reviews

Unique Launching

The Pacific Northwest recently experienced a unique launching of a new transportation unit. Launched from the ways of the creosoting plant of Pope & Talbot Lumber Co. at St. Helens, Oregon, located on the Willamette River near Portland, was a 110 foot barge built at the plant from 117,000 board feet of lumber which had been treated with preservative material at the company's plant. The barge has a width of 32 feet and depth of 7 feet. The lumber used in constructing the barge was treated under an 8-pound pressure per cubic foot with a mixture of 50 per cent creosote oil and 50 per cent petroleum. This barge is used to haul fuel. It is estimated that the life of such a treated material barge is 35 to 40 years as contrasted with a 15 to 18-year life of non-treated barges. The carrying capacity of the barge is increased by the elimination of ventilators made possible by the sterilizing treatment of the timber. The barge will carry 200,000 feet of lumber or 30 units of sawdust.

The Board of Directors of Gulf Shipbuilding Corporation has announced the election of the following executives and officers: E. A. Roberts, President; Capt. N. G. Nicolson, Executive Vice-President; Harry Hill, Vice-President and General Manager; T. M. Stevens, Vice-President and General Counsel; H. C. Slaton, Secretary-Treasurer.

FISH STORY

Here are five stalwart disciples of Izaak Walton . . . all well known to Pacific maritime circles . . . returning from a trip "outside the heads" with plenty of proof of their angling skill.

From left to right our readers will identify Rudy Beard, and C. M. "Dad" LeCount of General Electric Company; Hal Squires, industrial manager of San Francisco's Chamber of Commerce, Commander Lowell of the U. S. Navy, and Tony Wills of the Moore Dry Dock Company.

Dad LeCount brought us the picture and tells us that all hands shared honors . . . with an average of 4.0125 fish per person.

The power cruiser "Carol" (also pictured) is proving a delightful rendezvous for maritimers who like to stalk the festive stripers.

Sales Appointment

The Cating Rope Works, Inc., Maspeth, New York, has recently appointed the Charles A. Young Company exclusive Pacific Coast distributors of K-ting rope. Headquarters of the Charles A. Young Company, who also represent the Gilmore Wire Rope division of the Jones & Laughlin Steel Corporation, is at 272 Fremont Street, San Francisco.

Charles A. Young, head of the company, has had wide experience in the marine field, having been connected with the Grace Lines and Swayne & Hoyt Company for a number of years. He recently visited the Cating plant and is enthusiastic over the high standards of manufacture and careful testing of K-ting rope. A feature of this rope, which greatly lengthens its life, according to Young, is the process of center strand lubrication for reducing internal friction.

Moore - McCormack Personalities

Admiral H. I. Cone, Chairman of the Board of Directors of Moore-McCormack Lines, will arrive on August 26th to be present at the launching ceremonies of the S.S. Mormacsun, 7:15 p.m. August 28th, at Moore Dry Dock yards, Oakland, California.

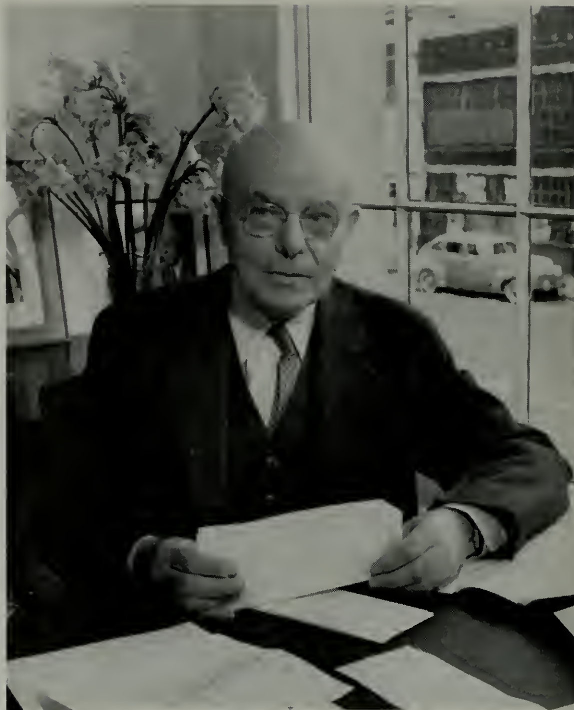
President Albert Voorhies Moore, who has been on the Pacific Coast since the early part of the month surveying business conditions in the Northwest, San Francisco and Los Angeles, returned from the latter port, accompanied by **Commander K. H. Donavin,** on Saturday, August 24th.

Superintending Engineer I. D. Eby, well known on the Pacific Coast, with headquarters in the New York office of Moore-McCormack Lines, has also been a visitor on the Pacific Coast. He has been surveying the Mormacsun at Moore Dry Dock yards preliminary to her launching.

Unusual interest has been aroused over the launching of the Mormacsun due to its being a night operation.

Miss Carlota Sepulveda Chapman, sponsor, together with her maids of honor, the Misses Nan Tucker and Dagmar de Pins, will be widely acclaimed because of the presence of numerous photographers and newsreels.

Special lighting arrangements are being made to make the night ceremony a brilliant spectacle.



Charles H. Pearson, Veteran Yale Hoist Manager

Norton Pacific Sales Makes Bow

The Yale & Towne Manufacturing Company, Philadelphia Division, announces a consolidation of its Chain Hoist and Hand and Power Truck sales organization on the Pacific Coast.

Headquarters of the Pacific organization have been established in a new building at 1219 Folsom Street, San Francisco, under the management of Charles H. Pearson, veteran Pacific Coast District Sales Manager of the Hoist Division.

New home of Yale products is Norton Pacific Sales Co. in San Francisco.

The new home of the material handling equipment division, operating under the name of the **Norton Pacific Sales Company,** provides ample facilities for a complete stock of trucks and hoists and parts.

Personnel of the new organization includes: Charles H. Pearson, District Sales Manager; Hand and Power Trucks sales, Howard W. Craig, Carl E. Lang and in Southern California, W. O. Hicks; Hoist sales, D. E. Eshom; H. E. Selden is in charge of stock and warehouse and M. Reisig, office manager.

In the Northwest territory the Hand and Power truck sales representatives are the Charles H. Day Company of Portland and the Industrial Products Company in Seattle.

News of the Propeller Clubs of the United States

The Port of San Francisco

Tirey L. Ford
President

Frazer A. Bailey
First Vice-President

Charles L. Wheeler
Second Vice-President

Eugene Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
John E. Cushing
Kenneth K. Dawson
Fred L. Doelker
Tirey L. Ford
Hugh Gallagher
A. S. Gunn
Edward H. Harms
George Jordan
Roger D. Lapham
Ira S. Lillick
Joseph A. Moore
Charles L. Wheeler

Paying high tribute to the U. S. Maritime Commission and its ship building program, J. Lewis Luckenbach, President of the American Bureau of Shipping, on August 12 addressed the regular monthly luncheon meeting of the San Francisco Propeller Club in the Palace Hotel.

"The Maritime Commission did a lot of things at first that people didn't like," he said. "The Commission had been given a mandate to build ships, and in the light of past experience in government ship building, the Commission was naturally viewed with a great deal of suspicion. But I want to say this Commission, under the able chairmanship of Admiral Land, is turning out good ships and ships that we may all look to with just pride. They are fire proof in every respect, have the finest possible cargo handling gear, welded seamless hulls, and will do twice as much per ton as most of the ships with which they will be called upon to compete.

"The Commission has done exhaustive experimenting in different types of propulsion machinery, with the result that they have done experimental work that private ship builders could not afford to do, and now the Commission is offering to these companies, ships of proven stability and efficiency, and ships that will suit the operators' respective trades. They have encountered some difficulties, to be sure, but these are all of a minor nature and easily correctable."

Mr. Luckenbach called attention to part of a recent report which he made as President of the American Bureau of Shipping. In this report he stated:

"Since my last annual report in January, which covered generally the progress in construction, six months have elapsed and in that comparatively short space of time there have been contracted for 60 seagoing vessels (2,000 gross tons and over)—of 537,300 gross tons.

"It is interesting at this point to note that for the period mentioned 24 new ocean going vessels have been classed, aggregating 161,026 gross tons and 30 existing vessels of 131,820 gross tons. The balance of miscellaneous small craft and barges brings the total classed at this time to 330,573 gross tons.

"Further, the Maritime Commission has withdrawn 20 vessels of the laid-up fleet for reconditioning. Ten of these are already under contract with repair yards for modernization, the balance to follow shortly. These contracts will involve about $3,000,000.

"The use of welding continues to be adopted more freely and advancements in this art have been made from day to day. No radical changes in machinery and equipment are to be reported except in the way of refinements in order to eliminate the minor troubles which always accompany any advancement in engineering.

"Real progress is being made in the actual construction of ships and the yards of the country are now established on a firm production basis, turning out efficient up-to-date ships in a scheduled sequence."

August 13, 1940

Mr. Bernard DeRochie
Pacific Marine Review
500 Sansome Street
San Francisco, California

Dear Mr. DeRochie:

It was very thoughtful of you to send me a tear sheet from your valuable publication, in which there is printed the picture of the officers and past presidents of the Propeller Club, Port of New Orleans. We had a very pleasant evening with Arthur Tode and Harry Parsons, and have heard since that they were given a right royal good time in San Francisco.

Yours for American Shipping,
L. B. PATE,
National Vice-President,
West Gulf Coast Region.

Lukens Steel Promotion

Elwood G. Stewart, who has been acting traffic manager of Lukens Steel Company, Coatesville, Pa., since November, 1939, has been appointed traffic manager of the concern.

Mr. Stewart was born in New York in April, 1907, and was educated in the public schools of Atlantic City and Camden, N. J.

In 1923 Mr. Stewart joined the accounting department of the Pennsylvania Railroad where he continued until June, 1931, when he entered the traffic department of Lukens. He was promoted to assistant traffic manager in May, 1935.

3 Skippers Inspect Sea Witch

Captain Thomas Garlick (left) and Captain Alfred Croskey (right), both of whom started sea life in sails, inspect the new motor liner Sea Witch of the American Pioneer Line with her commander, Captain Samuel Lee (center). The Sea Witch, first of nine new motor ships for the Line's services to the Far East, is named after one of the most famous vessels of the clipper ship era, but unlike her predecessor, sports no gilded dragon as her figurehead.

Of 13,900 tons displacement, the Sea Witch makes 16 knots and with her sister ships now being completed will establish the fastest regular freight service between the east coast of the United States and the Far East.

NEW RUBBER COMPOUNDS HAVE HIGH ELECTRICAL CONDUCTIVITY

Specialized compounds of natural rubber and synthetic rubber with a high degree of electrical conductivity have been recently developed by its laboratory research chemists, it is announced by The B. F. Goodrich Company, Akron, Ohio.

The company also announces that it can now furnish solutions of synthetic rubber which can be applied to the surfaces of natural rubber products like paint, and which will carry away static. This material has already had successful application as belt dressing to carry away static from transmission belts.

Electrically conductive compounds can generally be made softer and more "rubbery" from synthetic rubber, while in the case of natural rubber the compound has to be "loaded," and consequently is stiffer and less yielding.

Natural rubber, unless specially compounded, has the highest electrical resistance of any solid material. For conducting static, a certain amount of resistance is desirable, since it prevents sparking, and the specialized compounds, both in synthetic and natural rubber, allow the amount of resistance needed to remain in the material.

Diamond Power Specialty Corporation announce the removal of their offices in New York City to 271 Madison Avenue, Suite 1605-6.

Heavy Orders in Marine Reduction Gears

Production of marine reduction gears at the 85-acre Westinghouse steam division works is reaching record pace to enable the American Navy and merchant marine to complete speeded-up building schedules on time. More than a million and a half horsepower is represented by marine reduction gears now on order at Westinghouse, with an estimated total cost of around $9,000,000.

Although some of these gears are more than twice the height of a man, they must be machines with the same precision as a fine watch or a microscope. The slightest discrepancy in the virtually perfect machining of these gears could cause an objectionable noise when turning at high speeds.

Several hundred teeth must be cut around these giant gears with an accuracy of tooth spacing that permits a tooth-to-tooth spacing error not exceeding 1/10,000th of an inch, or about 1/50 of the thickness of a medium-weight sheet of paper.

During the cutting operation the gears must be air-conditioned. They are lowered into a sealed room, which is maintained at constant temperature during the seven days of continuous cutting which the larger gears require.

Once the final cutting operation has started, it must not be stopped until the job is done, since a pause in the work would cause measurable inaccuracies. To insure this continuous operation, the cutting machinery is supplied by a separate power station of its own, and in case something should happen to this, storage batteries stand by ready to be automatically switched into service.

All this care is taken to reduce noise, one of the major problems in the manufacture of reduction gears. Efficiency of operation is no longer a problem. They continue to have an efficiency of 97 to 99 per cent, which has been theirs since the first full-sized marine reduction gear was produced. Previous to this, the turbine was connected directly to the propeller, so that both rotated at the same speed. A medium speed was used that was faster than desirable for the propeller and slower than that at which the turbine operated most efficiently. Several years of research followed, and in 1909 the first successful large gear was manufactured.

This success cleared the way for the satisfactory and efficient use of turbines on all types of vessels. Since that time, Westinghouse has given many contributions to perfect the marine reduction gear. Among them was the first double-reduction gear in 1915; the nested, or "single-case" gear, which takes the same advantage of gear arrangement as a pocket watch, in 1917; the first fabricated marine-gear housing, 1925; the fabricated gear wheel, 1929; temperature control for tooth-cutting machines, 1932; elimination of run-in and hand-work on teeth, 1933; and the buffing of pinion teeth to reduce pitting and wear, in 1939.

Trade Literature

Type SU Speed Increasers, a new 24-page illustrated booklet, No. 3650, published by the Westinghouse Electric & Manufacturing Company, and describing units designed especially to supply output speed in excess of that which can be directly obtained with economy and safety from ordinary prime movers.

In successive sections, the ring bound, heavy cover booklet presents application data, construction features, views and explanations of modern manufacturing processes employed, four pages of tables and sketches giving complete dimension information, ordering instructions and pictures of successful applications.

Flow diagrams, fully described, explain the positive pressure lubrication system used. A full four pages devoted to application data contain tables of input and output rpm, horsepower capacities and explantory paragraphs on how to use them in selecting the correct gear unit.

Steel Lockers, Cabinets, Shelving, No. 44 Series A, by the Penn Metal Corporation of Pennsylvania, a pocket booklet of 28 pages. Gives detailed specifications and prices of heavy gage steel lockers, cabinets and shelving. Summarizes applications and points out possible savings in floor space, material handling time and tool control operations.

Rectangular Switchboard Instruments, a new 16-page illustrated catalog of types HA, HX, HY and HZ, is announced by the Westinghouse Electric & Manufacturing Company. These instruments are especially designed for flush and projection mounting on switchboards, panels, control desks or similar apparatus.

Full ten pages of the catalog are devoted to a complete listing, including prices of the entire H line of ac and dc ammeters, voltmeters and wattmeters; ac varmeters, frequency meters, power factor meters, synchroscopes and rectifier type milliammeters and voltmeters; radio-frequency ammeters and milliammeters of the thermocouple type.

Controlling Liquid Level, publication 2939 of the Cochrane Corporation, describing five different methods of liquid level control.

Positive regulation of liquid level is highly important in providing smooth, continuous operation, and in assuring uniformity of finished product in processes.

Cochrane Liquid Level Controllers find wide adaptation to services in the power and process fields. They control levels and regulate the flow of liquids to or from surge tanks, storage tanks, stills, receivers, absorber towers, heaters, condensers and evaporator units.

Complete descriptions of the operation and advantages of each type simplify proper selection from tabulated data that include operating characteristics and list prices.

Transportation Lines on the Atlantic, Gulf and Pacific Coasts, a book published by the Board of Engineers for Rivers and Harbors, War Department, and issued as No. 5 of the Transportation Series. The reports in this series contain information covering shipping conditions and transportation as affecting the use of our water routes and ports.

This report gives information concerning the transportation lines and cargo-carrying vessels operating on the Atlantic, Gulf and Pacific Coasts and their tributary waterways, except the Mississippi River System.

Table No. 1 in the report gives an alphabetical listing of the 982 transportation lines, concerns or individuals shown in the report. Only such lines or individually-owned and operated vessels as are used in the transportation of goods and/or passengers have been included in the study. Table No. 2 gives a complete description of the vessels, including the draft of vessels when loaded, heights of superstructures above the waterline when light, and the cargo handling equipment available. Table No. 3 gives a description of the operations by lines.

Mackay Radio

The Mackay Radio and Telegraph Company announces that it has received an order from the Bath Iron Works, Bath, Maine, to supply the radio equipment, supervise installation and provide radio inspection, maintenance and repair service on four new cargo vessels being constructed for American Export Lines. This is in addition to the previous order for the same equipment and service on eight vessels built and building at the Quincy, Mass., plant of the Bethlehem Steel Corporation for American Export Lines.

The installation on these 12 vessels is a line of shipboard radio equipment designed recently by Mackay Radio to set new standards of efficiency and economy. It includes a 300-watt main transmitter, 200-watt high-frequency transmitter and 50-watt emergency transmitter; all-wave receiver, auxiliary stand-by receiver and emergency crystal receiver; binnacle type radio direction finder, and the auto alarm.

This equipment is all mounted on a special arrangement of panels and operated from a master control panel, an exclusive installation feature which has been developed by the Mackay Radio engineers. All interconnecting wires and cables in the radio room are concealed, and the arrangement is such that all equipment is independently mounted and not affixed to the bulkheads.

Two-In-One Steel Locker

The Penn Metal Corporation of Pennsylvania are introducing a locker especially designed for use in cramped quarters or for any installation where a saving in floor space is an important consideration.

Each locker of this design is 15" wide, 21" deep and 73½" high, including a 1½" base, and is divided into two coat compartments, each of which is 7½" wide, 21" deep and 54" high. Each compartment is provided with two single-prong coat hooks and a coat rod. The two hat compartments are each 15" wide, 21" deep and 9" high.

Flat key locks are furnished for each coat compartment door. When opened, each door automatically unlocks a hat compartment.

The lockers are fabricated from first-grade heavy-gage furniture steel to prevent sagging or warping. Frame members are spot-welded for strength and rigidity, and there are no rough edges, faulty handles, hinges, latching devices or other annoying defects.

PACIFIC

Northwest Marine Review

by Chas. F. A. Mann

Vast Naval Program for Puget Sound

Word was received in Seattle and Tacoma shipbuilding circles August 24 that the Navy Department had approved a $177,000,000 shipbuilding program, chiefly destroyers, to be spread out over the next four years on a ratio of one-third to be constructed at the Bremerton Navy Yard and two-thirds at Seattle and Tacoma shipyards. The plans follow word of purchase of a large tract of land on Harbor Island in July adjacent to Seattle's huge Todd plant. Unofficial sources claim that 60 per cent of the privately-built naval ships will be built in the expanded Todd yard in Seattle, and 40 per cent will be built in Tacoma.

In all events, the August 24 Navy Department announcement means the immediate construction of the largest shipbuilding facilities ever operated on Puget Sound, and one of the largest orders for naval vessels ever placed on the Pacific Coast.

Stormy Career of P.N.O. Line Ended

With the handing over of the S.S. West Casetta to the reorganized American Mail Line July 19, the stormy career of the stop-gap service operated by the Pacific Northwest Oriental Line between Puget Sound and the Orient is ended, and the final tangle in the American Mail set-up is eliminated. The old American Mail Line is now ready to acquire fast new freight-passenger vessels from the Maritime Commission as fast as they are ready.

Lake Washington to Build Four Ships

Lake Washington Shipyards were awarded a naval contract late in July to build four 150-ft. Navy tenders, a part of an order of 12 to be built to service steel anti-submarine nets. These tenders will have diesel power, and their cost is placed at $500,000 each. W. C. Nickum & Sons of Seattle, who have a contract for engineering details and specifications for the 12 Pacific Coast ships, as well as 4 additional vessels on the Atlantic Coast, will supervise construction on behalf of the Navy Department.

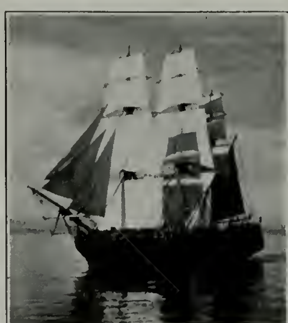
The Lake Washington Shipyard is also working on a contract for 1,000 anti-submarine net floats at a total cost of $400,000, each float to be 6 x 10 x 4 ft. and constructed of wood.

H. F. Alexander Boomed

Dropping on Seattle and Tacoma friends, H. F. Alexander, one-time Pacific Coast shipping executive and head of the Admiral Oriental Line and the Pacific Steamship Company, was active in his Northwest campaign for a spot on the Maritime Commission, where two vacancies will occur prior to September 1. He received widespread endorsement from local shipping people, and plans to stay in Washington, D. C., until late in September.

Nickum & Sons Get Huge Orders

W. C. Nickum & Sons, naval architects of Seattle, have taken an entire half-floor at 71 Columbia Street, Seattle, and increased their staff to about 25 men, to handle the $5,000,000 conversion contract on the former American Mail liners President Grant and President Jackson, and four $2,000,000 Navy tug contracts placed with: the Lake Washington Shipyards, Seattle, Wash.; Commercial Iron Works, Portland, Ore.; the General Engineering & Dry Dock Co., Oakland, Calif.; and the Marietta Mfg. Co., Pt. Pleasant, West Va.



The Nickums have added Laurance Peabody to their staff to handle the work on the two naval conversion jobs on the President ships. These ships are now known as the USS Harris and USS Zeilin, and will be unique Marine Corps fast transports, completely equipped to land 1,000 men and full supplies for a month's shore duty, including every kind of gear and facilities required to set up a Marine landing party at any point in the Western Hemisphere.

The naval contract for the 16 submarine net tenders will keep the rest of the staff busy.

Historic S.S. Northwestern a Floating Hotel

The historic S.S. Northwestern, retired Alaska S.S. Co. passenger ship, will again go into service, this time to Dutch Harbor, Alaska, where she will become a floating hotel for 300 employees at the new Naval Air Base.

Originally the Ward liner Orizaba, she was brought to the Coast to alternate with the old Victoria on the Seattle-Bering Sea route. Built in Chester, Pa., in 1889, she was retired in 1937.

She will go to Dutch Harbor in service for the Siems Drake Puget Sound Company, under her own power, after her quarters are enlarged, and serve her owners as a floating hotel. The Siems Drake Co. have the contract for the big new air base in Alaska

Building in American Yards

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Hulls Nos. 5360-5364, five C-1 cargo vessels for U. S. Maritime Commission, 395' x 60' x 37'6": 6400 gross tons each; 4000 H.P. Full scantling steam propulsion type. Keels laid, No. 5361, March 4, 1940; No. 5362, August 8, 1940. No. 5360 launched August 6, 1940.

Two destroyers for U. S. Navy.

DRYDOCK AND ROUTINE REPAIRS:

U. S. H. B. General Frank M. Coxe, President Cleveland, W. S. Rheem, Waimea, Maya, President Pierce, Admiral Halstead, Aztec, Polarine, U. S. Dredge A. Mackenzie, Point San Pedro, Toltec.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One all-welded steel hog fuel barge 36' x 134'.

One 45' tug.

Four anti-submarine net tenders.

DRYDOCK AND ROUTINE REPAIRS:

Charles Christenson, San Rafael, Pilot Ship Columbia, Rhododendron, U. S. C. G. Cutter Pulaski, Michurin, De Soto, Tugs Jean, Inman and Patricia.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. Keel laying dates June 3, June 17, December 9, 1940, and March 5, 1941; launching dates November 25, 1940, and February 19, April 28 and July 24, 1941; delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Two 44-foot standardized sloops, "Island Clipper" class.

One 55-foot ketch-rig yacht.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Schiller Street
Alameda, Calif.

NEW CONSTRUCTION:

Order placed for construction of four anti-submarine net tenders.

DRYDOCK AND ROUTINE REPAIRS:

Foy Derrick Barge, American Fisher, Barge No. 201, State Barge No. 22, Tug Arabs, New St. Joseph, Standard Oil Barges Nos. 9 and 4, Tug Daylight, Noyo, Hoquiam, Dante Alighieri, Esther Johnson, Morris.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners; length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 H.P.; 10 knots speed; cost $160,000. Delivery date October, 1940.

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

U. S. C. G. C. Rose, Kailua, Leviathan, Lightship No. 88.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION:

Order placed for construction of four anti-submarine net tenders.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Marmex, Yacht Radio, De Roche, Antietam, Yacht Paragon.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

Order received for construction of two fuel barges (Y044 and Y045), dated July 11, 1939. Keel laid, No. Y044, April 1, 1940.

Order received for construction of one seaplane wrecking derrick (YSD14), dated January 22, 1940.

Order received for construction of one submarine tender (AS12), dated June 12, 1940.

Order received for construction of four submarines (SS236-SS239), dated June 28, 1940.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hull No. 196, Sea Star; cargo vessel for U. S. Maritime Commission; LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6", SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. Launched December 22, 1939.

Hulls Nos. 197, Sea Panther, and 198, Mormacsun, two C-3 vessels for U. S. Maritime Commission LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6". Launching dates, No. 197, June 11, 1940; No. 198, August 28, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Willapa, Jane Christenson, Purse Seiners El Commodore and California Star, Olinda, Lena Luckenbach, S. C. T. Todd, Madoera, Silversandal, Hauraki, Lake Frances, Standard No. 1, Chirikof, Norfolk Maru, Heffron, Floridan, St. Mihiel, Arizonan, Samoa, Marina, W. S. Rheem, Hanley, Panaman, San Joaquin, Silver Ray, Hawaiian, Coalinga, Klipfontein, Iowan, District of Columbia, A. H. Payson, Mapia, J. C. Fitzsimmons, Texan, La Purisima, Frank G. Drum.

PACIFIC DRY DOCK & REPAIR CO.
Foot of 14th Ave.
Oakland, Calif.

NEW CONSTRUCTION:

One all-welded steel oil barge 148' x 38' x 9'; 300,000 gal. capacity.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Launched May 16, 1940.

Monssen (Destroyer No. DD436). Launched May 16, 1940.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10), seaplane tender; keel laid October 27, 1939.

Biscayne (AVP11), seaplane tender; keel laid October 27, 1939.

Casco (AVP12), seaplane tender; keel laid May 30, 1940.

Mackinac (AVP13), seaplane tender; keel laid May 30, 1940.

SEATTLE-TACOMA SHIPBUILDING CORP.
Foot of Alexander Ave.,
Tacoma, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. **Keel laying dates,** March 5, April 15, August 12, **September 26, 1940,** and February 26, 1941. **Launching dates, August 1,** September 28, 1940, and February 1, March 1, July 1, 1941. Delivery dates, January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:

Tug Tyee, Dredge Dan C. Kingman, Malama, West Ira, Honomu, Camden, Crown City, Oduna, Romulus, Panama Express.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 143, purse seine fishing boat for Spiro Babich, Gig Harbor, Wash.; 95' x 25'; 400-H.P. Atlas engine. Launching date, June 1, 1940.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. Keel laying dates, February 5, February 19, August 15, November 10, 1940; and March 1, 1941. **Launching dates, August 8,** October 10, November 10, **1940;** March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Four sand barges 148' x 36' x 15' 6" for Panama Canal.

Ten coal barges 175' x 26' x 11' for stock.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hull No. 178, DD424, Niblack, 1620-ton destroyer for U. S. Navy. **Delivered August, 1940.**

Hulls Nos. 180-181, DD429, Livermore, and DD430, Eberle, two 1620 ton destroyers for U. S. Navy. Delivery dates October and December, 1940.

Hulls Nos. 182-183, DD437, Woolsey, and DD438, Ludlow, two 1620-ton destroyers for U. S. Navy. Delivery dates April and July, 1941.

Hulls Nos. 184-187, four cargo ships for American Export Line; 400' x 60' x 39'.

Hulls Nos. 188-189, DD457 and DD458, two destroyers for U. S. Navy.

Hulls Nos. 190-195, DD449-451, 467-469, six destroyers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy. Launched November 15, 1939, and March 26, 1940.

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S Navy. Keels laid March 27 and May 15, 1940.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450' B.P. x 66' x 42' 3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons. No. 1481 launched June 22, 1940.

Hulls Nos. 1485-1487, three tankers 502' x 68' x 37'; 21,000 tons.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co.; 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co.; 15,450 tons dwt.

Hulls Nos. 1494-1497, four heavy cruisers for U. S. Navy.

Hulls Nos. 1498-1501, four light cruisers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hull No. 4331, Esso Albany; 16,300 dwt. ton tanker for Standard Oil Co. of N. J.; 18 knots speed. Launching date April 27, 1940.

Hulls No. 4338, Delorleans; and No. 4339, Deltargentino; two passenger and cargo ships for Mississippi Shipping Co. Launching dates, No. 4338, February 17, 1940; No. 4339, July 13, 1940. **No. 4338 delivered.** Delivery date, No. 4339, December 1, 1940.

Hulls Nos. 4341-4343, three cargo vessels for Seas Shipping Co.

Hulls Nos. 4344, James Lykes, 4345-4348, five C-1 cargo vessels. No. 4344 launched July 27, 1940.

Hull No. 4349, Esso Nashville, tanker for Standard Oil Co. of N. J. 13,000 tons dwt.; 13 knots. Launched June 15, 1940; **delivered August 7, 1940.**

Hulls Nos. 4350-4352, three cargo vessels for Seas Shipping Co.; 450' x 66' x 34'; 6300 H.P.; 8500 gross tons.

Hulls Nos. 4353-4356, four oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9,800 gross tons.

Hull No. 4357, oil tanker for Union Oil Co. of Calif.; 442' x 63' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4358-4359, two oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9800 gross tons.

Hulls Nos. 4360-4361, two oil tankers for Union Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4362-4364, three cargo and passenger vessels for Mississippi Shipping Co.; 465' x 65'6" x 39'9"; 8600 H.P.; 8300 gross tons.

Hull No. 4365, oil tanker for Richfield Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4367-4368, two oil tankers for Panama Transport Co.; 487'6" x 68' x 37'; 7000 H.P.; 9800 gross tons.

Hull No. 4369, oil tanker for Continental Oil Co.; 442' x 64' x 34'10"; 3500 H P.; 8000 gross tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417' 9", breadth 60' 0", depth 37' 5". Launching dates October 1 and December 1, 1940; and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

Hulls Nos. 8021-8022, two destroyers for U. S. Navy.

U. S. NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD425, Madison, 1600-ton destroyer. Launched October 20, 1939; **completion date September 2, 1940.**

DD426, Lansdale, 1600-ton destroyer. Launched October 20, 1939; completion date November 1, 1940.

DD433, Gwin, 1600-ton destroyer. Launched May 25, 1940; completion date March 1, 1941.

DD434, Meredith, 1600-ton destroyer. Launched April 24, 1940; completion date May 1, 1941.

DD441, Wilkes, 1600-ton destroyer. Launched May 31, 1940; completion date July 1, 1941.

DD442, Nicholson, 1600-ton destroyer. Launched May 31, 1940; completion date September 1, 1941.

DD461, 1600-ton destroyer. Completion date February 12, 1942.

DD462, 1600-ton destroyer. Completion date April 12, 1942.

DD472, 1600-ton destroyer. Completion date March 1, 1943.

DD473, 1600-ton destroyer. Completion date May 1, 1943.

DD474, 1600-ton destroyer. Completion date July 1, 1943.

DD475, 1600-ton destroyer. Completion date September 1, 1943.

DD476, 1600-ton destroyer. Completion date January 1, 1943.

AVP21, Humboldt, seaplane tender. Completion date October 12, 1941.

AVP22, Matagorda, seaplane tender. Completion date December 12, 1941.

YF258, covered lighter. Launched August 9, 1940; completion date September 1, 1940.

YSD11, seaplane wrecking derrick. Launched July 22, 1940; completion date November 15, 1940.

YSD20, seaplane wrecking derrick. Completion date May 1, 1941.

YSD22, seaplane wrecking derrick. Completion date January 1, 1941.

YSD23, seaplane wrecking derrick. Completion date March 1, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.
NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P. 714′ 0″, beam to outside armor 108′ 0″, std. displ. 35,000 tons; geared turbine engines; express type boilers. Launched June 13, 1940; contract delivery, September 1, 1941; estimated delivery date, October 15, 1941.

BB 61, Iowa, battleship; LOA 880′, beam 108′; 4500 tons standard displacement; geared turbines. Keel laid June 27, 1940. Contract delivery date August 1, 1943.

BB 62, Missouri. Order placed June 12, 1940.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.
NEW CONSTRUCTION:

Two steel tugs 90′ x 23′ x 10′; Fairbanks Morse 805 H.P. engines; for U. S. Navy. **Delivery dates August and September, 1940.**

Two 82′ diesel tugs each powered with 575-hp F-M engine.

One 90′ diesel tug; 805-hp F-M engine.

Two 77′ diesel tugs; 450-hp F-M engines.

One 100′ diesel tug; 805-hp F-M engine.

Two wooden deck scows for Tri-boro Scow Co.; 118′ x 36′ x 10′.

One wooden dry dock section for Bethlehem Shipbuildng Co., Brooklyn.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.
NEW CONSTRUCTION:

Hull No. 166, sub-chaser PC-451, for U. S. Navy. Length 170′. **Delivery date, August, 1940.**

Hull No. 167, Sub-chaser, PC-452, length 174′, for U. S. Navy. Keel laid March 14, 1940.

Hulls Nos. 168-170 (YT145-YT148), three 100′ harbor tugs for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.
NEW CONSTRUCTION:

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1693-1701, nine welded steel car floats 250′ x 34′ x 9′ 1″ for Pennsylvania R.R.; 5346 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 943 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135′ x 27′ x 11′ 9″ for Semet Solvay Company; 290 gross tons.

Hulls Nos. 1728-1735, eight type W-7 welded bulk cargo barges 175′ x 26′ x 10′ 8″ for stock; 3776 gross tons.

Hull No. 1736, one welded steel oil fuel storage barge for Brooklyn Edison Co.; 375 gross tons.

Hulls Nos. 1737-1739, three welded steel oil barges, 195′ x 35′ x 9′ 9″, for stock; 598 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hull No. 1750, one 1300-hp twin screw diesel towboat 176′ x 36′ x 10′ for stock; 590 gross tons.

Hull No. 1751, 760 H.P. twin screw diesel towboat 145′ x 26′ x 8′ for stock; 318 gross tons.

Hulls Nos. 1752-1756, five welded steel gasoline barges 195′ x 35′ x 9′9″ for stock; 2990 gross tons.

Hulls Nos. 1757-1759, three welded coal barges 134′ x 34′ x 17′ for M. & J. Tracy, Inc., New York City; 2301 gross tons.

Hulls Nos. 1760-1767, eight welded sand and gravel barges, deck type, 130′ x 34′ x 10′, for Warner Co., Philadelphia, Pa.; 3616 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.
NEW CONSTRUCTION:

Hull No. 36, Tautog (SS199); standard displacement 1475 tons; launched January 27, 1940; **delivery date August 27, 1940.**

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; launched March 27, 1940; delivery date, September, 1940.

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laid December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons; keel laid February 14, 1940.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons; keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 6, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.
NEW CONSTRUCTION:

Hulls Nos. 160, Plunkett; and 161, Kearny; two torpedo boat destroyers for the United States Navy. Launched March 9, 1940. **No. 160 delivered July 16, 1940.**

Hulls Nos. 165, Almeria Lykes; 166, Howell Lykes; and 167; three C-3 cargo vessels for U. S. Maritime Commission. Launching date, No. 166, July 13, 1940. **No. 165 delivered July 16, 1940.**

Hulls Nos. 168-169, CL51, Atlanta, and CL52, Juneau, two 6000 ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison, and 171, Ericsson, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172, Joseph Lykes; 173-176, five C-1 cargo vessels for U. S. Maritime Commission. Keels laid, No. 173, May 6, 1940; Nos. 174-175, June 6, 1940. **Launching date, No. 172, August 3, 1940.**

Hull No. 178, Esso Concord, tanker for the Standard Oil Co. of N. J. **Delivered July 18, 1940.**

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo ships for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co.; 13,000 dwt. tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co.; 15,000 dwt.

Hulls Nos. 194-197, four destroyers for U. S. Navy.

Hulls Nos. 198-203, six destroyers for U. S. Navy.

Hulls Nos. 204-205, two destroyers for U. S. Navy.

GULFPORT BOILER & WELDING WORKS, INC.
P. O. Box 1179
Port Arthur, Texas
NEW CONSTRUCTION:

Hull No. 153, tugboat for General Motors Corp. 100′ x 24′ x 12′ 4″; 1000 shp G.M. diesel and auxiliary.

Hull No. 157, tugboat. 70′ x 18′ x 10′ 3″; 400 hp Atlas diesel and auxiliary.

Drill barge for W. T. Burton Co., Sulphur, La. 118′ x 44′ x 16′ hull with superstructure.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.
NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. Delivery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147′ x 35′ x 7′ 6″. **Estimated completion date, September 1, 1940.**

One oil barge, 195′ x 35′ x 9′ 9″, for C. J. King, Dothan, Ala. Completion date, July 29, 1940.

One oil barge, 225′ x 35′ x 10′ 0″, for Standard Oil Co. of Kentucky. Completion date, August 16, 1940.

One oil tanker for Husky Transit Corp., Minneapolis, Minn.; 235′ x 35′ x 14′. Estimated completion date January 3, 1941.

One derrick barge for Dunbar & Sullivan Dredging Co., Detroit, Mich.; 100′ x 43′ x 10′. Estimated completion date November 1, 1940.

Three steam turbine vessels for American-South African Lines; 492′ long, 69′ 6″ beam; 9500 shp; 18,000 tons dis.; 19 knots speed.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.
NEW CONSTRUCTION:

One steel twin screw carferry, 406′ x 57′ x 23.5′. Approximate dates, **launching date, September 18, 1940;** delivery date, January 4, 1941.

One steel twin screw diesel towboat, 140′ x 35′ x 8′ 6″. Delivery date, November, 1940.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.
DRYDOCK AND ROUTINE REPAIRS:

China Arrow, Deer Lodge, West Celeron, West Honaker, U.S.C.G. Tender Beech.

JOHN H. MATHIS CO.
Camden, N. J.
NEW CONSTRUCTION:

Four anti-submarine net tenders for U. S. Navy.

One bulk carrier tanker 265' long for Thos. Bowes, N. A.

DRYDOCK AND ROUTINE REPAIRS: U. S. N. Tug.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 372, oil tanker for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39'. Keel laid February 5, 1940.

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid, No. 381, December 26, 1939; No. 382, February 5, 1940; No. 383, June 10, 1940; No. 384, August 12, 1940. **Launching dates,** No. 379, June 7, 1940; **No. 380, August 7, 1940.**

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. Length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 7,700. Keel laid, No. 387, August 12, 1940. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. Length 435', breadth 63', depth 40' 6"; gross tonnage about 8,000. Delivery date August 1, 1941.

Hulls Nos. 390-391, (CL62-CL63), two light cruisers for U. S. Navy.

Hulls Nos. 392-394 (CV9-CV11), three aircraft carriers for U. S. Navy.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

AV4, Curtiss, seaplane tender for U. S. Navy; launched April 20, 1940.

AD15, Prairie, destroyer tender for U. S. Navy. Launched December 9, 1939.

AV5, Albemarle, seaplane tender for U. S. Navy; keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland, and CL56, Columbia, two cruisers for U. S. Navy; order placed March 23, 1940.

CL57 and CL58, two cruisers for U. S. Navy. Order placed June 12, 1940.

U. S. NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Submarines SS201, Triton; SS202, Trout; SS209, Grayling, SS210, Grenadier; SS205, Marlin; SS228, SS229, SS230, SS231, SS232, SS233, SS234, SS235.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp.; 1600 gross tons; 300' x 65' x 20'; steam Una-Flow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. **Launching date September 1, 1940;** delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413' x 60' x 37' 6"; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Launching date November 1, 1940; delivery dates January and March, 1941, respectively.

Hull No. 1079, tug for Long Island R.R. Co.; 105' x 24' x 12' 11"; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. Launching date October 15, 1940; delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Launching date December, 1940; delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 193, one tanker for Standard Oil Co. of Calif.; 7,000 dwt. tons. Delivery date March, 1941.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 18,000 dwt. Delivery dates March and June, 1941.

Hull No. 196, one tanker for Sun Oil Co.; 18,000 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons.

Hull No. 207, tanker for Standard Oil Co. of New Jersey; 18,000 dwt. Delivery date August, 1941.

Hulls Nos. 208-210, three tankers for Standard Oil Co. of N. J.; 16,400 dwt.; steam turbine.

Hull No. 211, tanker for Atlantic Refining Co.; 19,400 tons.

Hull No. 212, tanker for Sun Oil Co.; 18,000 tons.

Hulls Nos. 213-215, three tankers for Standard Oil Co. of N. J.; 18,000 tons; steam turbine.

Hulls Nos. 216-220, five tankers for Standard Oil Co. of N. J.; 18,000 dwt.

Hulls Nos. 221-222, two tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine.

Hulls Nos. 223-225, three 16-knot tankers for The Texas Co.; single screw steam turbine; 13,285 tons dwt.

Hulls Nos. 226-228, three tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine.

Hull No. 229, tanker for Atlantic Refining Co.; 19,400 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 34-36, three C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered. Delivery date, No. 34, October 1, 1940.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

New Spark-Arrester Snubber

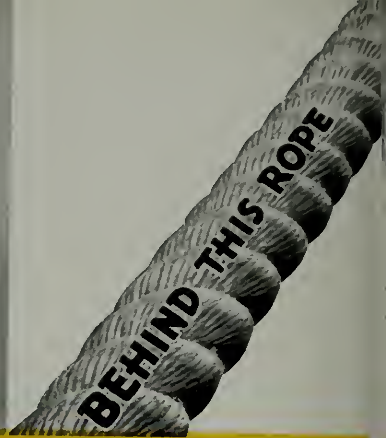
A new spark-arrester snubber, known as the Burgess SDM Series snubber, for quieting exhausts of marine engines, has just been announced by the Burgess Battery Company. Besides preventing exhaust noise, it has a special internal design which keeps solid matter, such as soot, ash and flying sparks, from reaching the atmosphere.

The internal circuit of the gases in this new snubber is so arranged that flying sparks and other solid particles are diverted into a carbon trap by centrifugal action as the fast-moving slugs of exhaust gas enter the snubber. This centrifugal action also breaks up the slugs, whirling them into the final snubbing stage, where they are snubbed to a smooth flow. The resulting stream of gas passes on to the atmosphere without pulsation or noise. Back pressure is low, because a low impedance path is provided for slow-speed gases.

Mounted in a vertical position, each snubber has large hand hole at the bottom for removing accumulations of carbon. They are manufactured in 19 standard sizes, ranging from 1 inch to 32 inches.

PACIFIC MARINE REVIEW

Gears!
A Prime Essential


BEHIND THIS ROPE


...DDEN plus VALUES

Official Organ

Pacific American Steamship Association

Shipowners Association of the Pacific Coast

PACIFIC MARINE REVIEW

OUR COVER

With the increased tempo of both naval and mercantile shipbuilding, great demands are being made on the gear-cutting capacity of American manufacturers. Our cover shows one of the pinions being lowered into position in a reduction gear for a type C-3 cargo ship. Each pinion will be driven by a 4250-hp diesel engine at a nominal speed of 200 rpm. The single reduction gear will deliver to the propeller 8500 shp at 80 rpm. This is one of a series of marine gear drives being built at the Nuttall Works of the Westinghouse Electric & Manufacturing Co. at Pittsburgh.

—Photo through courtesy of Westinghouse.

Contents - October, 1940

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J. S. Hines, President and Publisher
B. N. DeRochie, Assistant Publisher
Paul Faulkner, Advertising Manager
Alexander J. Dickie, Editor
F. Dryden Moore, Assistant Editor

VOLUME 37
No. 10

PACIFIC MARINE REVIEW

OCTOBER
1940

American Industry for National Defense and Democracy

There is much loose talk about capitalistic industry blocking national defense, and a great deal of very sloppy editorial material and press comment to the same effect.

The following letter, written by J. S. Knowlson, president of Stewart-Warner Corporation, represents with fair exactness just what we are sure is going on in the great majority of American industrial corporations in these trying times. It was mailed to each employee of that firm:

"*In the semi-annual report, you will note that the personnel of the company and its manufacturing facilities have been offered to the country. This offer has been made in your name and that of every employee of this company.*

"*This is a business made up of real Americans, and each and every one of us wishes to do his part in the coming months or years, for we realize that as a nation we are in the most serious times we have ever known.*

"*We and others like us are American industry.*

"*There has been a lot of bunk about industry in the last few years. The talk still goes on. Statements are in circulation today to the effect that American industry is holding back; refusing to cooperate with the Government; demanding large profits; etc.*

"*Some people believe this.*

"*If your friends ask you what your company has done so far, you can tell them this:*

"*Your company has bid (on a competitive basis) on ten millions of dollars of Government work against many other companies.*

"*So far we have been awarded approximately two million dollars worth of Government contracts. We have already begun making delivery on some of these contracts. The prices at which they were taken are such that up to July* 31, *we lost* $60,000 *on what we shipped. This loss represents what we have paid out of our own pockets to learn how to do our job. This is not profiteering.*

"*We have purchased, or have on order, over* $450,000 *of new machinery. We are buying this machinery with our own money. That is not refusing to start until the Government finances us.*

"*There are limits to what we can do, but we have reason to be proud of what we have done so far.*

"*There is one kind of patriotism that stands on the street corner and makes a lot of noise, and another kind that buckles down to work and does the thing that it knows how to do best.*

"*This is our country—and it's about the only country left where a man can call his soul his own. If we want to keep it that kind of a country, we must all take a direct and personal interest in what goes on.*

"*There is a national election this fall, and it is the first duty of every American citizen to vote, and to vote as intelligently and as wisely as he can. If we don't take the care and the trouble to pick representatives of the right sort, we have no one to blame but ourselves.*

"*I am urging you to think—and I am urging you to vote.*

"*To vote you must register.*

"*Registration days will soon be announced.*

"*Be sure you and your families register, and be sure you vote in November.*

Truly yours,

J. S. KNOWLSON, President."

American labor and American industrial management now enjoy conditions almost immeasurably better than those existing in the other great manufacturing nations. The maintenance of the so-called American standards of freedom in life and action depends solely on the intelligent interest that the Amcrican people will take in local, state and national political affairs.

The Bids on The P-4 Design

A very good instance of the type of press comment referred to in the first paragraph of our lead editorial is provided by the Washington Merry Go Round column as printed in the *San Francisco Chronicle* of September 19. We quote:

Washington. Sept. 18—How difficult it is for the Government to build up a merchant marine reserve is illustrated by the inside story of the Maritime Commission's efforts to get two large luxury liners built for transpacific service.

As early as two years ago the Maritime Commission conceived the idea of building two passenger vessels with smokestacks on the side, so they could be converted into airplane carriers at a moment's notice. The idea was welcomed by the Navy, but the Maritime Commission couldn't get a single American shipping yard to bid on the vessels.

All of them were busy with naval orders, and also they didn't like the fact that the Maritime Commission worked out its own designs. So they turned a cold shoulder.

One gathers from these paragraphs that the Maritime Commission has been unable to get bids on these passenger liners for two years because: every shipyard in America has been so busy on naval work; because every shipbuilder in America objects to the Maritime Commission's working out its own design for these ships; and because every shipbuilder in America objected to smokestacks on the side.

As an "inside" story, that certainly deserves some sort of a reportorial award. In the first place, the Maritime Commission has a bid. Its own public announcement syndicated to every important daily in America reads:

Washington, Sept. 10, 1940: The Maritime Commission announced today the receipt of a bid from the Seattle-Tacoma Shipbuilding Corporation, Seattle, Wash., for construction of two transpacific luxury liners for operation from San Francisco to the Orient.

On a fixed price basis, the bid was $28,458,000 *for each of two; and on an adjusted price basis,* $23,175,000 *for each of two. Time for construction of first ship,* 1080 *days; second ship,* 1445 *days.*

In the second place, it is only during the past two months that even a majority of the shipbuilders of America have been so busy with naval work that their eagerness to bid on merchant work has been affected thereby. In fact, there are on or two large yards on the Atlantic Coast that have no naval work, and apparently are not going after any.

In the third place, it must be apparent that the location of the smokestack in the design of these vessels, while it might be objectionable from the viewpoint of the passenger traffic manager, certainly forms no great problem to the shipbuilder. Practically every shipbuilder in the United States for the past two years has been bidding on Maritime Commission designed steamers and motorships so that it cannot be objection to Maritime Commission designing per se that is holding up these bids.

We suggest that the authors of the Washington Merry Go Round column do a little investigating and get a real "inside" story on this matter.

In the meantime, the only bidder—the Seattle-Tacoma Shipbuilding Corporation—should be given a contract to build these vessels. They are well able to do the job, and since the ships are for transpacific service, a Pacific Coast yard should have the preference.

This illustration is made from a photograph of a model of U. S. Maritime Commission P-4 design.

Comm. H. L. Vickery, U.S.N. (C.C.), (ret.), member Maritime Commission.

Vickery Appointed to Maritime Commission

The nomination of Commander H. L. Vickery. U. S. Navy, retired, to succeed Edward C. Moran as a member of the U. S. Maritime Commission, was confirmed by the Senate on September 24 a few minutes after it had been received from President Roosevelt.

Commander Vickery, a citizen of Brookline. Mass., had a long and honorable career in the Construction Corps of the United States Navy, and in 1937 was head of the War Plans Unit in the Bureau of Construction and Repair. Late in that year he was selected by Admiral Emory S. Land, chairman of the Maritime Commission, to be his senior assistant. In this capacity Commander Vickery organized the complete Technical Division of the Commission. This division has charge of design construction and tests of all hulls and machinery for ships built to the order of the Commission.

This appointment gives the Navy three members on a Commission of five—Admiral Land. Admiral Wiley and Commander Vickery. However, Admiral Wiley's term expires on September 26 at midnight, so that the Navy majority may be short-lived.

Commander Vickery is by experience and training eminently qualified for this post. We need Pacific Coast representation on the Maritime Commission, but in the crisis now facing the world, all sectional interest should retire in favor of efficiency.

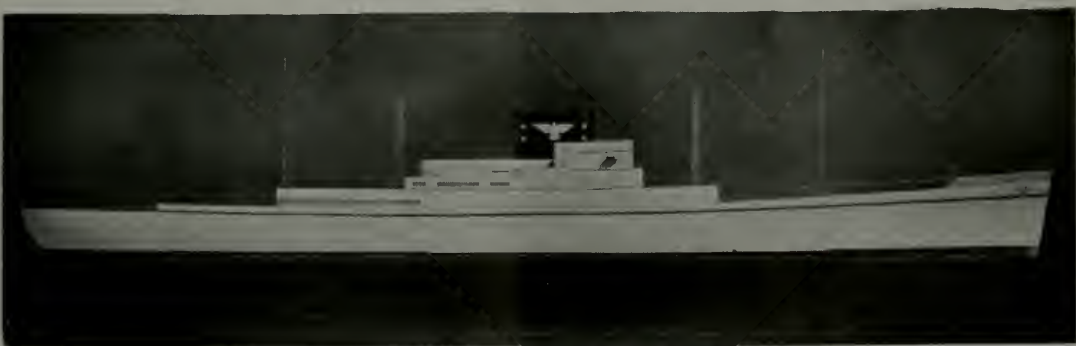
Pacific Coast Foreign Trade Increase

Notwithstanding the many current camplaints about lack of shipping activity and absence of business, the foreign trade of the Pacific Coast. both in exports and imports, is forging ahead of last year.

Exports for the first seven months of 1940 totaled $221,890,943, as compared with $203,866,274, an increase of approximately 8 per cent. For the same period imports increased from $94,719,259 for 1939 to $134,296,021 for 1940, or 42 per cent.

Figures given by the Pacific Coast district office of the Bureau of Foreign and Domestic Commerce indicate that as the year advances the rate of increase over last year goes up quite sharply. In July (the last calendar month for which figures are available) 1940 recorded $36,618,643 in exports, as against $26,606.203 for 1939. or an increase of 39 per cent. Imports show a similar trend, the import increase for July running from $12,322,032 for 1939 to $22,852,572 for 1940, a percentage increase of nearly 85 per cent.

The three larger customs districts of Washington, San Francisco and Los Angeles make up together over 85 per cent of the Pacific Coast total, and the increases in these three districts made up almost 100 per cent of the total increase for the entire Coast.



Artist's conception of the appearance of the C-3 combination cargo and passenger round-the-world steamers, seven of which are now under construction at Newport News for the American President Lines. The first of these steamers will be delivered about October 16, 1940.

National Defense Program

Allots Huge Orders To

Backlog of Construction for

For the past two years, Pacific Marine Review has been predicting a boom in the Pacific Coast shipbuilding industries. Now that boom has come upon us very suddenly, and much effort and money is being expended to prepare existing plants to take care of the shipbuilding demand.

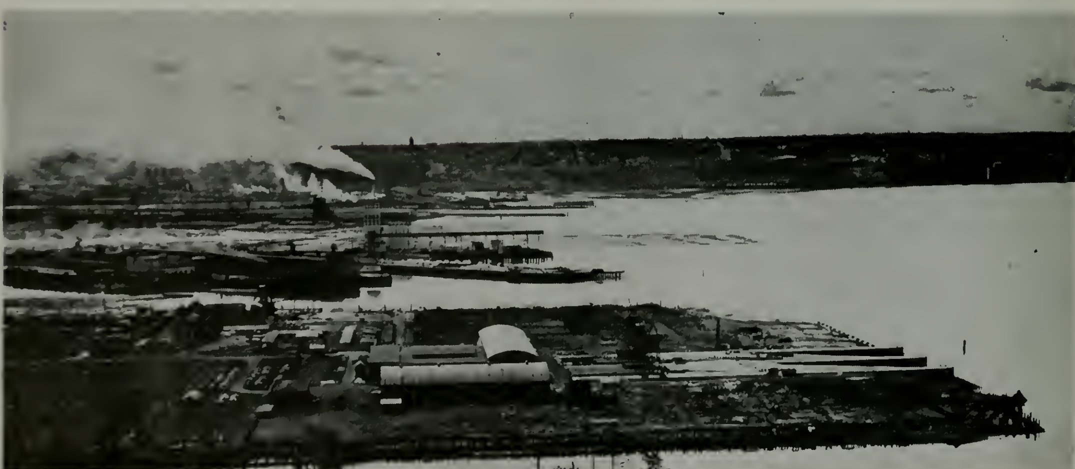
Our prediction was based on the accumulation of natural demand in the merchant marine, due to the age and slow speed of existing fleets. The boom now upon us comes from emergency national defense appropriations, and is largely naval. This superimposes an emergency boom on a natural demand, and that should make the boom both more intense and of longer life.

At this writing, the work under way, contracts in hand, orders and allocations in the Pacific Coast shipbuilding industry, aggregate considerably over $700,000,000. The details appear in the table herewith.

This is apparently just the beginning of a lengthy period of prosperity for our shipyards. The basic demands remain and will be much more acute before the emergency demands are fully met. The emergency demands as presently evidenced in contract and allotment will keep the existing yards busy for at least four years. It is, therefore, a fairly safe prediction that the period of 1940-1950 will be a decade of fairly continuous prosperity for the Pacific Coast shipbuilding industry.

It will be apparent from the table that this shipbuilding program is coast-wide. This is best indicated by the building of new yards and the expansion of existing yards involved in the allotments. There are two such projects at Puget Sound, one at San Francisco and two at Los Angeles.

In the Puget Sound territory, the great bulk of the work comes to the Seattle-Tacoma Shipbuilding Corporation. This firm now operates a new shipyard on Commencement Bay, Tacoma, where it is busy on five C-1 U. S. Maritime Commission cargo motorships and four C-3 U. S. Maritime Commission cargo steamers. The yard has two complete ways, ample space for welding racks, and ample space for expansion. They are sole bidders on the P-4 type of U. S. Mari-



Pacific Coast Shipbuilders

Coast Yards Now Over $700,000,000

time Commission liner, and if granted an award on this bid, are prepared to spend nearly two million dollars in expanding their facilities to construct these vessels, which will be the largest commercial hulls ever built in America.

Seattle-Tacoma Shipbuilding Corporation has also an allotment of 20 torpedo boat destroyers for the U. S. Navy. It is the intention to build a complete new and modern yard on Harbor Island, Seattle, for the construction of these 20 hulls.

At San Francisco, the Potrero Works of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Co. has five C-1 U. S. Maritime Commission cargo steamers, 20 U. S. Navy destroyers and four cruisers. For expansion of this plant, the property immediately adjoining on the east has been acquired from the Columbia Steel Co. This area, now occupied by warehouses for the storage of steel stocks, was used by Bethlehem for the construction of numerous destroyers during the first World War. Here a complete new and modern shipyard will be built. The present plant at the Potrero Works of Bethlehem is being expanded by the addition of one large building slip.

Los Angeles Shipbuilding and Dry Dock Company has a nice allotment to build a U. S. Navy fleet repair

On facing page, we show the Tacoma yard of the Seattle - Tacoma Shipbuilding Corporation just before laying the first keel. This yard was built complete in 100 working days. Here the Tacoma shipbuilders have a program of 5 C-1 and 4 C-3 ships for the Maritime Commission, and here they propose to expand for the erection of the P-4 passenger liners, largest commercial vessels ever built in America.

At right: A busy day in the Moore Dry Dock Co. yard, Oakland, Calif., showing 3 C-3s under construction and many large repair and reconditioning jobs.

Shipbuilding on the Pacific Coast

Work Under Contract or Allocated as of October 1

PUGET SOUND	
Seattle-Tacoma Shipbuilding Corp.	
Tacoma Yard	
5 C-1 motorships	$ 10,000,000
4 C-3 steamers	12,000,000
2 P-4 steamers (?)*	46,000,000
Yard expansion	2,700,000
Seattle Yard	
20 U. S. N. destroyers	138,000,000
Yard expansion	5,000,000
Lake Washington Shipbuilding Co.	
4 A.S.N.T., U.S.N.	2,000,000
1000 A.S.N.T. floats	400,000
Puget Sound Navy Yard	
10 destroyers	70,000,000
Auxiliary vessels	12,000,000
TOTAL PUGET SOUND	$298,100,000
SAN FRANCISCO BAY	
Bethlehem Union Yard	
5 C-1 steamers	$ 10,000,000
20 destroyers	160,000,000
4 cruisers	120,000,000
Yard expansion	3,000,000
Moore Dry Dock Co.†	
3 C-3s	8,000,000
Western Pipe & Steel Co.	
5 C-1 motorships	10,000,000
4 C-3 steamers	12,000,000
General Engineering & Dry Dock Co.	
4 A.S.N. Tenders	2,000,000
Mare Island Navy Yard	
8 submarines	48,000,000
2 sub tenders	24,000,000
Auxiliary craft	2,000,000
TOTAL SAN FRANCISCO BAY	$399,000,000
LOS ANGELES	
Consolidated Steel Corp., Ltd	
4 C-1 steamers	$ 8,000,000
Bethlehem San Pedro Yard	
6 destroyers	48,000,000
Yard expansion	1,000,000
Los Angeles Shipbuilding & Drydock Co.	
1 fleet repair vessel	13,000,000
TOTAL LOS ANGELES	$ 70,000,000
TOTAL SAN FRANCISCO	399,000,000
TOTAL PUGET SOUND	298,100,000
GRAND TOTAL, PACIFIC COAST	$767,100,000

* Only bid on these vessels. Contract under consideration. Claimed by Puget Sound interests but not yet awarded by Commission.

† On September 26, U. S. Maritime Commission announced a contract awarded to the Moore Dry Dock Co. for 3 modified C-2 steamers for the Ocean Dominion Line at $2,850,000 for each ship, or a total of $8,550,000.

The San Francisco works of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company, Inc. At the upper right is the area occupied by the Columbia Steel Company and recently purchased by U. S. Navy for expansion of the Bethlehem facilities for building destroyers.

vessel. This yard will have to be completely reconditioned and equipped for this work.

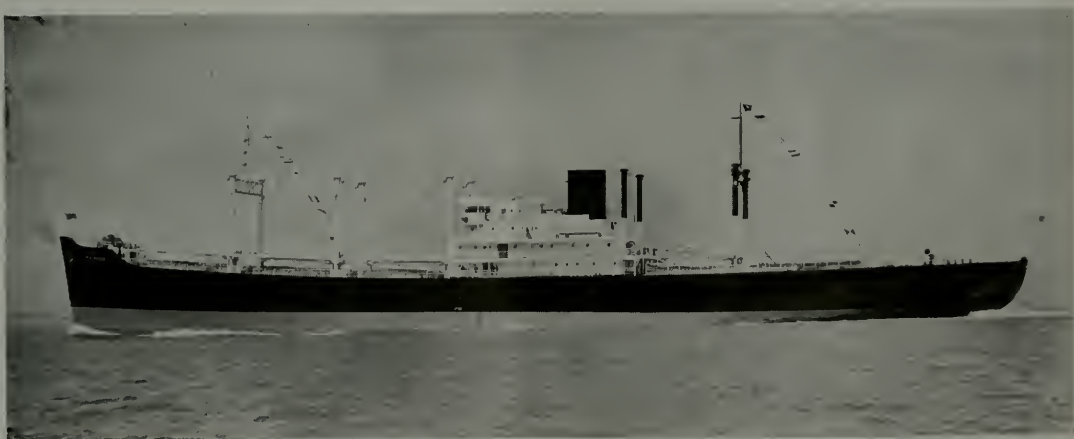
The San Pedro Works of the Union Plant of the Shipbuilding Division of Bethlehem Steel Co., which is to build six destroyers, will practically be transformed into a new yard for this purpose. For 18 years this plant has handled only drydocking and repairs.

For the next few months, then, we shall witness some feverish activity in the building or rebuilding of five shipyards on the Pacific Coast, an undertaking involving some 8 to 10 millions in labor, materials, equipment and cost of real estate. This means comparatively large sales of: welding and flame-cutting equipment; steel fabrication machinery, such as rolls, punches and brakes; air compressors and pneumatic tools; machine shop equipment, and especially large boring mills, planers and lathes; and material handling equipment.

With the urgency being impressed on the national defense program, it will soon be apparent that deliveries of machinery and equipment will constitute a bottleneck that can only be overcome by the use of local plant to manufacture a larger proportion of these items. Thus the benefits of this shipbuilding boom will be spread to all Pacific Coast industries and through pay rolls to every Pacific Coast business.

Construction and equipping of 32 merchant vessels and of 81 naval vessels means a lot of work for the manufacturers of marine power plants and of marine auxiliary machinery. The following is a partial list, the

(Page 58, please)



The Sea Arrow, built by the Moore Dry Dock Co. First Maritime Commission ship delivered from a Pacific Coast yard.

Some Observations on

Discolored Sea Water

by W. E. Allen

Scripps Institute of Oceanography, University of California

Although the ocean, or any of its subdivisions, is far from being uniform or constant in color that condition usually receives scant attention. It is only when an observer notices some unexpected richness, or quality, or kind of color that he shows special interest in what he calls "discoloration." Because discolorations are subject to the same kinds of modifications as familiar or expected colors they are no more uniform or constant in appearance than the latter. That is to say, they differ somewhat according to the intensity of light, angle of light rays, amount of shading by clouds, movement of the mass of water, depth of the water, position of the observer, density of the coloring materials, and so on.

Apparently, discolorations sufficiently prominent to be logged by a mariner or to attract particular attention from a casual observer are nearly all produced by small (perhaps mostly microscopic) particles suspended in sea water. Some of these, more or less "muddy" in appearance, may be nothing more than soil particles carried into the sea by windstorms or "run-off" floods from land. In fewer instances dust from volcanic explosions may contribute. At times these may help to make conditions favorable for an ensuing development of discoloration by microscopic plants. Judging from the comments of mariners, explorers, fisheries employees, scientific expeditions, and biological observers, it seems safe to say that the discolorations which receive definite notice are usually caused by microscopic plants.

Some shade, or tinge, of red is most often mentioned in comments on discoloration of sea water. Probably such comments can be found as far back as recorded history can carry us and it is probable that there has been no change in the causes of "red water" in historic time. At sea, two great groups of microscopic plants are likely to contribute the species responsible in any particular instance. These are the diatoms and the dinoflagellates. More rarely, other groups may take the lead in causing discoloration, and the color may not be red. All kinds are so small that from 2 to 500 individual cells could be enclosed in a drop of sea water without overcrowding. Such tiny specimens show very little color when examined singly. It is only when densely crowded that the sum total of color becomes observable.

For more than 20 years diatoms and dinoflagellates have been under investigation at the Scripps Institution of Oceanography, La Jolla (near San Diego), Calif. In that time discolorations have developed in several different years. In June, 1924, discloration was continuous for more than 2 weeks, beginning with reddish-brown and ending with dirty brown or grayish-brown as the population died off and turned to "stinking water." The duration of this discoloration was exceptional, probably because of mild weather and quiet seas. A dinoflagellate called *Prorocentrum micans* was most prominent.

In 1935 a yellowish discoloration was observed close inshore for 2 or 3 days in the height of the bathing season. Some people were afraid that some kind of contamination was present. The creature causing the trouble was so small that even a microscope of ordinary power was not sufficient for adequate study. It was not identified.

In 1938 a dinoflagellate called *Gonyaulax polyedra* became excessively abundant in the general region of San Diego, sports fishermen claiming it spoiled the fishing over a large area outside of San Diego. The "red water" caused by it was visible near La Jolla for more than a week, although great intensity of discoloration was noticed for only 4 or 5 days. Inshore discolorations are always streaky, partly because of wave action and the influence of currents. Any little ripple or wavelet is likely to show a thin streak of yellow froth, yellow partly because of mixture with air to form the froth. *Procentrum* is especially notable for froth streaks even when the population is too thin to discolor the water mass noticeably. The 1938 *Gonyaulax* population showed fewer narrow streaks of froth and more streaks varying from a foot to several yards in width. In these streaks the color ranged from light brownish-red to the dark red of drying blood most of the time, but on one day a few long wide streaks were seen which approached the bright red color of fresh blood.

Concerning the origins of discolorations there has been much speculation but very little accumulation of evidence because the details of origin are already matters of past history by the time that the discoloration is seen. In 1916 floods out of San Diego Bay were followed in several days by a widespread brownish discoloration caused by excessive growth of diatoms. The 1938, 1939 and 1940 cruises of the Scripps Institution research ship revealed the presence of discolored water at some stations a hundred miles or more from shore. For them Director H. U. Sverdrup was able to show a relation to "upwelling water." The 1924 "red water" mentioned

above had neither of these relationships. Such differences in observations and experiences lead naturally to the conclusion that discolorations due to inclusions of microscopic creatures in sea water may be final steps in series of processes considerably unlike in details.

Localities (even regions) differ widely in their tendencies to produce or exhibit plant discolorations. In Southern California seas intense discolorations are comparatively rare in contrast to the Red Sea where a microscopic "blue-green alga" called *Trichodesmium* appears with such remarkable frequency as to suggest the name "Red," and to the Gulf of California which has received the name (in Spanish) "Vermillion Sea" because of the frequency of appearance of "red water," caused most often by dinoflagellates. Some observers have reported that wide areas of the Arctic Ocean often become so deeply discolored with dense growths of diatoms that they deserve the designation "black water." Likewise voyagers in the Antarctic have found diatoms to be so abundant in some places that they discolor both water and ice floes over great distances. In the recent "Discovery Reports" the waters near south Georgia are especially mentioned for exhibitions of discoloration by diatoms although similar conditions are noticed in other Antarctic localities. The "Humboldt Current" off the Peruvian coast has been notable for decades because of the prominence of plant discolorations, mainly diatoms.

On calm seas at slow speed the marine wayfarer finds ample leisure to study the surface of the sea.

In most localities displays of discoloration by microscopic plants tend to be seasonal, some time in the spring in temperate and frigid climates, thus corresponding in periodicity with land plants. Gray's Harbor, Wash., marks one locality in which discoloration by diatoms along shore is annual, in late May. The Malabar Coast in India appears to be even more notable in respect to annual discoloration because of kinds of creatures involved and because of successive differences in colors. There a relationship to the southwest monsoons has been observed and discoloration may become pronounced in September or October according to weather conditions. Colors reported according to different organisms involved or according to conditions of development are "amber-brown," "red," "bluish-green," "yellowish-green," "yellowish-red," and "amber."

Specific mention of localities in which discoloration is extreme and periodic may appear to warrant a conclusion that other localities (or the sea as a whole) are barren. The records of the Scripps Institution suggest that such a view is untenable. Included in the 25,000 collections obtained since 1917 are series of surface catches from California to Australia, to Hawaii, to Alaska, and to Peru, which show that even in mid ocean a few diatoms and dinoflagellates can be caught at almost any time. Even if only one vigorous specimen to a cubic fathom is found it carries the possibility of increasing to thousands in surprisingly few days if the right growing conditions are met. But we have some thousands of catches from waters within 200 miles of shore which indicate that living specimens may occur to depths of 50 fathoms or lower and that the numbers rarely get below some hundreds to a cubic fathom. That is to say, almost all oceanic waters contain enough "seed" specimens of one kind or another to produce a crop of plants of discoloring density within a period of 2 to 4 weeks according to circumstances. A thin, or a moderate, population may exist for months or years before it finds the combination of light, temperature, food materials, and other conditions which will enable it to show discoloration.

In general, it may be said that if a discoloration of the sea extends to the horizon, or beyond, it is likely to depend on the presence of microscropic plants, although accompanying circumstances may suggest "dust storms" or dust from volcanic explosions as being responsible. More limited discolorations may be due to any of an indefinite variety of causes.—From U. S. Hydrographic Bulletin, Sept. 11, 1940.

The dark and deep blue ocean sometimes turns to red.

New

Combination Liners

For American Republics Line

The Moore-McCormack Lines, Inc., Will Take Over Four Fine Motor Passenger Liners Now Building at Sun Yard

Plans for expansion of the Moore-McCormack Lines' fleet, calling for the operation of four new combination passenger and cargo liners, were announced recently by Commander Robert C. Lee, executive vice president of the company. These vessels are now under construction at the yard of the Sun Shipbuilding & Drydock Company, Chester, Pennsylvania, and the first hull will be launched in December, 1940.

Each of the ships will accommodate 196 passengers, and the dimensions will be as follows:

492 feet length overall; 465 feet length between perpendiculars; 69 feet 6 inches beam molded; 27 feet 4 inches loaded draft; 17,500 tons displacement; 9,800 deadweight tons; 440,000 bale cubic, which includes 40,000 cubic feet refrigerator capacity. There will be 22 single rooms, 20 rooms with private verandas and 34 regular double rooms, a total of 76 staterooms.

The most novel feature of these new passenger ships is the fact that every stateroom and all public rooms are air conditioned. Each stateroom is supplied with fresh air and cool air, which the occupant of the room can regulate to suit himself. This will insure that each passenger has his room air conditioned to his liking, and the ventilation will be such that the air in the room will be continually fresh as well as cool. These are the first passenger ships ever built to have all passenger spaces air conditioned. Second among the novel features is that, in addition to a large amount of refrigerated cargo space, there is also a system known as "cargocaire," which provides conditioned air in all the cargo holds. This means that there will be no sweating in or on the cargo.

Another novel feature is the fact that the clubroom on the ship, which is actually a very large veranda cafe

Artist's conception of new Moore-McCormack motor liners.

having a dance floor, will have a sliding dome, which will open the entire ceiling to the sky. The after end of this veranda cafe has a folding glass partition, the opening of which will throw the entire room open to the swimming pool, located just aft. The swimming pool will be very large for this size of vessel, and will be all finished in a new type of tiling, which is non-slippery. The promenade deck is also very unusual for a ship of this size, being 300 feet long and glass enclosed at the forward end. All electric lighting will be indirect, of the latest type. There will also be provided a complete moving picture system similar to that installed in moving picture houses ashore, using standard machines and film, and fitted with a permanent projection room.

The 20 private veranda rooms are a new type, which has not been used to any great extent at sea. The main passenger corridor passes down the center line of the vessel, and these staterooms use the entire distance between that passageway and the ship's side. Each of these rooms is a small suite composed of bathroom, trunk room, bedroom and sitting room.

These ships have been built in accordance with all the latest developments in safety and fire prevention. The ship is divided into five fire isolation compartments. Non-combustible materials are used exclusively for bulkheads, furnishing and equipment. Stateroom paneling is being done in three woods—prima-vera, lacewood and teakwood. The furnishings are all of special design, particularly for comfort, safety and sanitation.

Propelled by a single screw driven by two Sun Doxford diesel engines developing a combined shaft horsepower of over 9,000, these vessels are assured of a speed of over 17½ knots. The hull is divided into eight watertight compartments, and has a 2-compartment stability. George G. Sharp of New York is the architect in charge of design, and the interiors have been designed by Raymond Loewy, famous industrial architect. The ships are of the Maritime Commission C-3 type, modified to accommodate passengers and for operation in Moore-McCormack's American Republics Line service between the East Coast of the United States and the East Coast of South America.

The Fleet of The Moore-McCormack Lines, Inc., Operating and Under Construction as of October 1, 1940

Ships Under Operation:

Argentina Brazil Uruguay	De Luxe passenger liners sailing fortnightly from New York for Barbados, Rio, Santos, Montevideo and Buenos Aires; returning fortnightly via Santos, Rio and Trinidad. Speed 19 knots, displacement 33,500, deadweight 20,000 tons.
Donald McKay Mormachawk Mormacgull Mormacdove Mormaclark Mormacwren Flying Fish Lightning	New C-2 cargo liners, speed 17 knots, deadweight 8,800 tons, except the last two, which are 9,500 tons. The first six carry 12 passengers in rooms all with bath.
Mormacpenn Marmacland Mormacyork Mormacmail Seafox	New C-3 cargo liners, speed 18 knots, deadweight 11,900, except the Seafox, which is 12,500 tons. All ships carry 12 passengers in rooms all with bath.
Mormacsul Mormacmar Mormacrio Mormacrey	Cargo vessels, speed 13 knots, deadweight 8,400 tons.
City of Flint Collamer Independence Hall	Chartered vessels of 8,000 tons deadweight for service in the Pacific Coast-East Coast of South America trade.

Total Deadweight of Existing Fleet .... 249,500 Tons

New Ships Under Construction:

Four C-3 passenger ships as yet unnamed.

These 18-knot ships of 9,000 tons deadweight are building at the Sun Shipyard, and are expected to go into commission shortly after the first of next year. They will carry 196 first class passengers, all in rooms with private bath. 20 rooms will have private veranda, and 22 will be for single occupancy.

Four C-1-B cargo liners as yet unnamed.

These 14-knot ships of 9,000 tons deadweight are building at the Consolidated Shipbuilding Corporation, and are expected to go into commission at the end of this year or the beginning of next. They will carry 12 passengers in rooms all with bath.

Total Deadweight of Ships Under Construction .... 72,000 Tons
Total Deadweight of Entire Fleet .... 321,500 Tons

Regulating Land and Water Carriers

by Paul D. Page, Jr.

Counsel for U. S. Maritime Commission

Two of the named purposes for the adoption of the Constitution of the United States were "to provide for the common defense" and "to promote the general welfare." It is not without significance that the framers of the Constitution, after specifying those objectives, granted to Congress as its second specific power the power to regulate commerce with foreign nations and among the several states. Commerce is the lifeblood of nations, and transportation constitutes the veins and arteries through which that lifeblood moves. The rise and fall of commerce is in great part the measure of the general welfare. The direct relation of efficient transportation systems to the national defense is too obvious to require comment.

In the realm of regulating transportation, we now necessarily deal with railroads, trucks, airliners, and the ships that move upon the waters. Each of these methods of transportation has been fostered by some form of governmental aid. It is, therefore, completely clear that those who utilize railways, highways, airways or waterways for their private profit are bound, in good conscience as by law, to respect and cooperate with Federal regulation.

It is equally clear that such regulation must be constructive, and not destructive, especially in times like these, when every phase of the national defense is being geared to unprecedented speed, and when the threat of unsought involvement in the insanity of war is a reality, not a mere nightmare. Putting the case of the water carriers, I need say only that when the rails are hot with strings of freight cars hurrying defense materials from place to place, producer and consumer groups must turn to the slower but less expensive facilities of water transportation.

Although our first regulatory authority was enacted in 1916, Commission regulation of water-carriers was deplorably slow in getting under way; so much so that twenty-four years later water-carrier regulation is still in the primary stage, and most of our policies and practices are more experimental than fixed. Without the slightest doubt, the past three years have seen more activity, development and progress in water-carrier regulation than did the twenty years preceding them. The Maritime Commission has not hesitated, and will not hesitate, to make its regulation fair, fearless and effective. It does not propose to tolerate evasion of issues, dilatory tactics, or any of the many methods frequently utilized to perpetuate, or at least prolong, indefensible practices which militate against the commercial welfare of the people served by water-carriers. And let me emphasize here that the Commission is completely convinced that the utmost expedition consistent with sound decision is a necessary ingredient of effective regulation.

Shipping Act 1916

An extraordinary feature of the basic statute upon which the Maritime Commission's regulatory activities rest, the Shipping Act of 1916, is that it contains the seeds of a plan akin to the Jeffersonian maxim, that the best government is the one which governs least, a plan providing for the self-regulation of water carriers. This is the conference system, whereby, under Section 15 of the Act, carriers may form conferences and enter into agreements between the conference members, designed to fix or regulate rates or fares, to give or receive special rates, accommodations, or other particular privileges or advantages to control, regulate, or destroy competition, to pool or apportion earnings, losses, or traffic, to allot ports, or to restrict or regulate the number and character of sailings between ports, to limit or regulate the volume or character of freight or passenger traffic to be carried, or in any reasonable manner to provide for exclusive preferential or cooperative working arrangements.

Necessarily, the grant of such tremendous power was accompanied by an appropriate safeguard found in the fact that before such conference agreements become effective, they must be approved by the Maritime Commission, and whenever it finds that such agreements are or have become unfair or discriminatory, or operate to the detriment of the commerce of the United States, or violate any provision of the Shipping Act of 1916, the Maritime Commission has authority to disapprove, and thereby kill them. A carrier who undertakes to act or operate under a disapproved conference agreement is subject to heavy penalties provided by the Shipping Act and prosecution under our Anti-Trust Laws.

This system assures the Maritime Commission full information with regard to the vital activities and practices of water-carriers operating through a conference, and encourages the carriers themselves to initiate and work out the solutions of their own problems. This assures maximum

freedom of "business" from what is all too frequently regarded as "government meddling," and has promoted good-will between the regulator and the regulated. Very frequently we are called upon to help "work out" agreements beneficial to the carriers, the shippers and the public. The fact that a strikingly small number of agreements have been disapproved by the Commission is proof that this system can and does work, and because of this fact, in addition to its inherent merits, I strongly recommend it insofar as it may be found applicable to other carrier industries.

A Regulatory Headache

Number One regulatory headache of the Commission is found in the problem of transportation between ports of the United States and the ports of foreign countries. In dealing with this situation Congress naturally did not attempt to authorize the Commission to pass upon the reasonableness of rates charged for transportation between our own and foreign ports.

However it has been found possible to deal with this delicate problem indirectly. By reason of the many advantages of being members of our conferences many foreign carriers seek membership, and are bound by the conference agreements, and these are subject to control by the Commission.

In extreme cases the Commission has invoked the power to make rules and regulations affecting shipping in the foreign trade, conferred by Section 19 of the Merchant Marine Act of 1920. As an example, only last year it appeared that two large foreign-flag shipping companies had put into effect deep rate cuts in an attempt to force competing American-flag carriers to enter into an agreement for an unjust division of revenue, particularly revenue derived from the transportation of coffee from the East Coast of South America to the West Coast of the United States. When American-flag ship operators refused to "stand and deliver," the foreigners reduced the rate on coffee from \$1.00 to 50 cents a bag. Upon the second day of the hearing, these carriers admitted the injustice of the rate war in which they were engaged, and consented to an order which in effect prohibited the practice. I cite this instance to show the delicate character of this particular phase of our regulatory activities and the way in which it has been found possible to solve intricate and inherently delicate questions by quick action. It shows further the self-restraint which the Commission must and does exercise, for it is conceivable that, acting under Section 19 in such a case, the Commission could have, and—had it been rash and ill-advised—might have prohibited ships of the offending foreign lines from entering any port of the United States, with inevitable international repercussions.

Terminal Problem

Another problem which besets the Commission as to rates, and which is accentuated by rates not subject to control by the Commission but falling within the province of others, occurs in railway-highway-water terminals. In most cases, our coastal and intercoastal shipping lines use terminal facilities either privately owned or owned by states or municipalities. The Maritime Commission has some control over terminal operators in connection with their handling of waterborne cargoes, but cannot control rates charged by terminals. States and municipalities have denied any authority of either the Maritime Commission or the Interstate Commerce Commission over state or municipal terminal facilities, including shipside and storage facilities and belt-line railroads, fighting upon the ground of state sovereignty, the authority of the United States itself.

The authority of the Government, through any agency it may select, to regulate such facilities under the commerce clause, has, we trust, been finally settled since 1936, when in United States v. California, 297 U. S. 175, Mr. Justice Stone upheld Federal regulations upon the ground that the state, when it engages in interstate commerce by rail, subjects itself to the Commerce power.

This problem, however, remains heavy. For example, where a terminal is railroad property, water-carriers who are required by law to file their actual rates, stating separately each terminal and other charge, privilege or facility allowed, find difficulty in stating rates which must include terminal charges for the receipt and delivery of cargo, and over the amount of which charges neither the water-carrier nor the Maritime Commission has control.

About the regulation of water-carriers, however, several points particularly stand out. The first is that water regulation, like rail regulation, developed in its early stages very slowly. The second is that, having gotten under way and come into willing hands, its progress has become rapid, steady and effective. The third is that the Commission recognizes that its basic act was framed upon the Interstate Commerce Act. We owe much to the guiding light of that Commission's many sound and well-considered decisions, and only regret that we are faced with so many problems involving elements which our elder regulatory brother has not faced, so that it is impossible for us to find in the mass of that Commission's precedents upon all points which come before us.

With all this help, it is only natural that we should feel that we have improved a little on our elder brother in initiative, speed and decisive action.

The American Merchant Marine means much to us. We should all consider and remember the words of Joseph Patrick Kennedy, our present ambassador to Great Britain, spoken when he was the first chairman of the Maritime Commission:

"The American Merchant Marine is our own flesh and blood, our own treasure, our own ships, and our own money. Get behind it with the pride, the enthusiasm, and the patronage that other nations emotionally and financially give to their own. Has the time come when we will turn our back on American genius and enterprise? Congress has given an emphatic 'No!' No American can do less than give it his whole-hearted support."

(Abstract of a speech before the Public Utility Section, American Bar Association, Philadelphia, September 10.)

The Handsomest of American-Built Clippers

(The initial arrival during September of Grace Line's C-2 cargo steamer Red Jacket recalls the famous American-built clipper ship for which this modern steamer was named. We are therefore reproducing here an abstract of the short history of this vessel written by that noted authority on American clipper ships, the late F. C. Matthews, for publication in Pacific Marine Review, November, 1922. The Red Jacket was one of the most consistent performers among the famous American clippers.)

The extreme clipper Red Jacket was justly celebrated for the delicate beauty of her graceful lines throughout; her particularly handsome arched stem was as pleasing to the eye as was her powerful but exquisitely molded stern, while her spars and rigging were correctly proportioned. To the end of her days as a sailing ship she was everywhere considered as the handsomest of the large clippers set afloat by American builders. The view showing her in the ice off Cape Horn is conceded by authorities who knew the ship well to be a very correct representation, while the picture showing her under the British flag exaggerates the amount of rake to the mizzenmast. The rake of the foremast is given as having been one and one-third inches to the foot, while that of the mizzen was one and one-half. The masts of the Flying Cloud all raked alike, one and one-quarter inches to the foot.

Built in Maine in 1853

The entrance lines of the Red Jacket were hollow and her ends were long and very sharp. She had three decks and her dimensions, according to Lloyd's Register, were: length, 251 feet 2 inches; breadth, 44 feet; depth of hold, 31 feet; draft, 22 feet; net gross and under-deck tonnage were all the same figure, 2305 tons. She was built by George Thomas at Rockland, Maine, and was launched near the end of 1853; her designer was Samuel A. Pook of Boston.

Her Maiden Voyage Still a Record

The principal owners of the Red Jacket were Seacomb & Taylor, although her builder retained an interest. She was sent from New York to Liverpool to try out her adaptability for the booming passenger and freight business between Great Britain and Australia. Uncoppered and manned by a very indifferent crew, she sailed from New York January 11, 1854, and arrived at Liverpool on the 23d, the elapsed time from dock to dock being 13 days, 1 hour, 25 minutes, establishing a record that stands to the present day. The following were the runs in nautical miles daily, commencing with Wednesday, January 11: 103; 150; 265; 311; 217; 106; 125; 319; 413; 374; 342; 300; 371. The passage was made without the loss of a rope yarn, although much stormy weather was experienced, with snow, hail and rain. She ran 15 knots on the wind and 18 knots with the wind abeam. Captain Asa Eldridge, who was one of the most prominent of Western Ocean packet commanders and who lost his life with the Collins Line Steamer Pacific, had the Red Jacket on her maiden voyage.

As Australian Packet Sets New Record

At Liverpool she was immediately chartered by the agents of the White Star line for a round voyage to Melbourne. Under command of Captain Samuel Reid she sailed May 4, 1854, arriving out July 12. The entry in the log of that date includes the following statement: "300 miles; fine weather; made King's Island at 10:50 p. m.; crossed the bar at 11:50 p. m.; passage from Rock Lighthouse to Port Philip Heads, 69 days, 11 hours, 15 minutes; under sail, 67 days, 13 hours; total distance ran, 13,880 miles." Her run from Liverpool to the Line was 25 days, due to light winds and very poor trades; in the South Atlantic the same conditions prevailed; crossed the meridian of the Cape of Good Hope in latitude 45 south June 24, 51 days out; running her easting down, went as far south as latitude 52 and had much cold weather with snow, hail and sleet, one log entry being: "entire forward part of ship covered with ice." Frequent notations are made of "high sea," "cross sea," "heavy gales," "strong gales and squalls," but the good clipper braved them all without mishap and fairly flew through the water, as the passage will show: 315 miles; 330; 263; 286; 287; 286; ——; 313; 300; 288; 400; 299; 350; 357; 334; 245; 300. The run of under 19 days from the meridian of the Cape to Melbourne is believed never to have been equaled, much less surpassed. An inspection of the log of the Thermopylae on her much vaunted passage of 24 days from Gravesend to Melbourne (62 days from Lizard) shows that she was nearly 22 days from the Cape meridian to 12 miles from Cape Otway.

10,243 Miles in 42 Days

The Red Jacket had good dispatch at Melbourne, sailing August; rounded the Horn on the 23d, only 20 days out; crossed the Line 42 days out, having run 10,243 miles; thereafter practically nothing but calms and light winds were encountered and she did not reach Liverpool until October 15, 31½ days from the Line; total passage, 73 days. Total distance run, 14,863 miles; average, 202¼ daily; best day, 376. The daily average for the first week was 231 miles; second week,

307 miles; third week, 254 miles; fourth week, 205 miles; fifth week, 237 miles; sixth week, 224 miles. During one whole week in the doldrums, the average was less than 100 a day, and the two following weeks, 142 and 106 miles only. The trip out and home had been made in 5 months, 10 days, 22½ hours, one week better than the voyage of the Marco Polo, which had been the record. On the homeward passage the Red Jacket was too light, but constantly showed her ability by logging 17 or 18 knots in fresh breezes, and 14 and 15 knots close hauled. She beat the British clipper Guiding Star 9 days; had 45,000 ounces of gold dust and about 28,000 sovereigns, of a total value of more than 200,000 pounds sterling.

The passage out and home excited considerable interest, not only on account of its great and unprecedented speed but likewise on account of the dangerous position in which the vessel was placed in the ice off Cape Horn in August. The original of the accompanying illustration was made up from several sketches appearing in the Illustrated London News, the work of a passenger, one view depicting the ship entirely surrounded with field ice. The artist-correspondent-passenger described this part of the voyage to the News as follows:

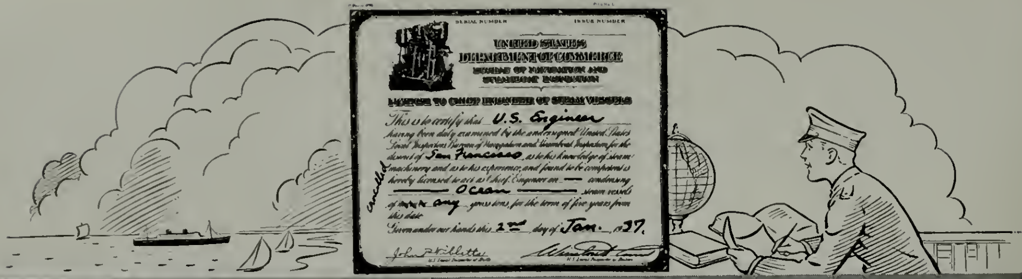
In the Ice Off Cape Horn

"Regarding the ice: on the morning of the 24th of August I was roused out of sleep by the noise of shortening sail, and the lookout singing out, 'Land!' The ice had been seen some time before, but the solid masses were supposed, in the dark, to be land. On getting out, I found we were in smooth water, and large masses of ice floating around us. As the day broke, we found ourselves sailing along a lake of water, not unlike a canal. The ice seemed to extend on every side, in solid fields, as far as the eye could reach, without any prospect of getting out, so that we had to follow this channel. All sail was clewed up, except the topsails; and as there was a good breeze, we proceeded along at about four or five knots. Our situation at this time seemed most appalling, as we appeared to be getting further into the ice, so that by ten or eleven o'clock we were almost making up our minds to remain for weeks in this fearful situation. About noon the captain and second mate, who had been on the fore-topsail-yard all morning, discovered clear sea again; to gain which we had to force a passage through dense masses of ice and it was here that she sustained the principal damage to her stem and copper.

"We soon got clear, and the rest of the day saw no trace of ice and were very thankful we had got off so easy. But to our dismay, at eight p. m. we again fell in with it. The ship was put about and sail shortened for the night, and we ran back to the clear water in which we had heen sailing. At daybreak sail was made; and at seven a. m. we came up to the ice. At first it was only large pans, much melted, the water having all the appearance of brine, and quite thick around them. Afterwards, large masses of broken icebergs presented themselves, and in guiding the ship through these, great difficulty was experienced.

(Page 62, please)

Clipper ship Red Jacket in the ice off Cape Horn.



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Marine Boilers V

CIRCULATION

QUESTION

What is the importance of the upper drum in boilers?

ANSWER

No. 1 of the 11 points of fundamental consideration, as listed in the September issue, is the subject of surface for steam separation. It will generally be conceded that it would be easier, less costly, to build a boiler without a drum, but it just would not work as a steam generator.

In later articles, where we will discuss various and novel boiler designs, we may note some small flash boilers in which water enters at one end of a tube and steam emerges at the other. This is not done in large practical steam generators, even at high pressures and with forced circulation.

Boilers must have a space which is filled about one-half with water and one-half with steam. The area of surface of water must be great enough to liberate the bubbles of steam emerging, and give them room to burst and separate steam from water. If we have insufficient area, such as in the case of overload, the water carries up with the steam, and the boiler delivers wet steam, sometimes called foaming or priming or just water carry-over. Also, if the water is too alkaline or soapy, the bubbles do not break so easily, and even at normal load we have foaming and carry-over.

So the drum is a necessity, and its diameter and length are fixed by the steaming capacity of the boiler. There is no limitation here with the Scotch boiler having excess water surface, but in modern water tube express boilers it is a matter of first consideration by designers.

Small bottom drums may be desirable from the mechanical standpoint of attaching tubes to act as a leader, and also to collect mud from blowdown. It is not a fundamental consideration. The bottom parts of many shore plants having water furnace walls is only a tube header large enough to carry the circulation.

QUESTION

What consideration must be given to adequate circulation in a boiler?

ANSWER

Circulation, although listed as No. 2 in the fundamentals, is fully as important as any other factor. Natural circulation, i.e., without use of pumps or injectors of any kind, is employed on most boilers. Without circulation in one or more tubes, the heat would not be removed, and a steam pocket would form, the tube soon reach red hot flame or gas temperature, and fail under the pressure by bulging out and blowing.

The interior of the wall of the tube, the water side, must be maintained at the temperature of the boiling water; the fire side, at only a few degrees higher, 50 to 100 degrees F. at the most. Therefore, water must be delivered to every sq. in. of heating surface at a rate fast enough to remove the heat.

Natural circulation depends on two principles: (1) the thermosyphon principle, and (2) the reduction of density due to formation of bubbles.

The thermosyphon system uses the difference in water density to cause circulation. It is inadequate for any rapid action. Furthermore, modern boilers usually have practically no difference in water temperature at the down comers and the upcomer tubes. The water is all at the boiling temperature. The furnace adds only the latent heat of evaporation. Heat of the liquid is added outside the boiler.

The reduction in density due to formation of steam is a source of rapid natural circulation. It is basically stable. The slower the circulation, the more rapid the formation of steam. The more steam, the greater the difference in head to cause the solid water in the down comers to move down and force the lighter mixture of steam and water out of the tubes.

The lowest permissible circulation would be where only steam blows out of the tubes. If circulation is reduced

below that, the steam formed would superheat and tube heat up, possibly to failure.

Circulation in a system having so many parallel paths is a very sensitive situation and may be easily upset. For instance, if blowdown was taken from a point not intended by designers, the normal up-water movement might be slowed in some tubes, or even reversed, to feed the run-off at the blowdown. This could easily blow out a tube.

Forced circulation has not been adopted in this country much yet. Very high pressures, where the steam bubbles are small, does not have as great a differential head to cause circulation, and forcing by pumps has been adopted in some cases. Forced circulation is the principal unique feature of the many odd kinds of boilers in England. The "Le Mont," "Sulzer," "Loeffler" and "Velox" are all samples, to be discussed in this section later.

Advantages claimed for forced circulation are: (1) can use smaller tubes, thinner walls; (2) reduction or elimination of drums; (3) can place heating surface to greater advantage with respect to heat transfer; (4) larger evaporation in given volume or space; (5) reduction in weight.

Offsetting these is pumping equipment and power used, and elaborate controlling mechanisms and protective devices.

Our next article will discuss combustion chamber designs and heating surface utilization.

QUESTIONS FROM THE SHIPS

QUESTION

How would you determine if a centrifugal pump was delivering its rated capacity? How is the rated capacity of the above pump arrived at?

W. E. H., Richmond, Calif.

ANSWER

It is not at all easy to do this without meters, as in the case of nearly all other types of machines. The following characteristics of centrifugal pumps may be useful, and give an indication or rough estimate of output.

(a) With speed normal, the load on the motor or drive unit varies with output. At normal output, load is normal; at zero output, load is small. For instance, note change in switchboard ammeter as you move discharge valve from closed to open. If current pick-up seems normal, it indicates the usual discharge.

(b) At normal speed, pressure at discharge, or difference between suction and discharge, should be normal. Principal cause of loss in pressure will be leakage of air at suction. Air going through pump reduces average density of fluid, and thus reduces pressure generated from centrifugal force. Other causes would be fouled or eroded impeller.

(c) The pressure difference is proportional approximately to the square of the speed. Slight drop in speed gives large drop in pressure.

(d) Pressure with shutoff valve is higher than when delivering fluid through open valve. This is due to pressure drop required to force fluid through resistance of pump. If a decided pressure drop is noted, it would indicate normal output. Ten per cent to 25 per cent might be noted. If suction is less than atmospheric pressure, this test may be affected because of change of leakage with flow.

(e) Sound may be an indication, as a difference may be noted with shutoff and open valve. Also sound of valve as it is being closed may indicate whether or not fluid is being stopped or wire-drawn.

(f) Other indications of pressures on both suction system and discharge system will all add their clues as to normal performance or not.

If a narrow difference is looked for, or a performance test is being made, we cannot avoid use of meters or volume or weight measures.

The designer is given a capacity and pressure to meet. He calculates necessary speed, which, with diameter and number of stages, gives the shutoff pressure. Then he makes the passages in pump large enough to carry the fluid at not too great a pressure drop and too high a velocity. Thus the principal dimensions of pump are fixed. The capacity must be delivered at the rated pressure with rated speed. If too much capacity is demanded (discharge pressure lowered too much) the pump will overload the driver drop pressure, but deliver a greater volume. A short-circuited pump, that is, no discharge back pressure, may overload to stalling, unless designed for this.

QUESTION

If you had a 220-volt motor generator, the generator delivering 120 volts, compound wound, 20 kw and 166 amps, and due to any number of reasons you find broken or chipped brushes on the generator end, and you have no spares. The generator has 12 brushes, four groups of three each. How many of these brushes can you remove, and still get by, and deliver the rated load? How does it affect the remaining brushes?

I would greatly appreciate your answering this for me, as it is a problem I have come upon in my work. I believe the series you are giving us is great. Do you plan to cover the high-pressure jobs with superheat, etc?

Sincerely,

W. E. H., Richmond, Calif.

ANSWER

We do not understand the use of a motor generator on board ship, unless it is a balancer set, to derive 120 volts to neutral from the 240 volts ship's power, in which case it would hardly be as large as 20 kw. You must be referring to some shop or dock-side equipment.

Furthermore, if the 240-volt generator is so adjusted (by paralleling fields and running at half speed, or by reducing field excitation) as to deliver 120 volts, and is 20 kw. at 240 volts, it would be good for only 83 amperes, and if carrying 166 would overheat, and brushes would chip.

Chipping of brushes is caused by over current and excessive sparking. Several causes besides overcurrent may cause sparking. If the brush is heated hot enough at edge or anywhere, it loses its strength and chips fall off.

Aside from mechanical failure from rough handling, overcurrent and/or sparking is about the only cause of this trouble. An oily atmosphere or oil on commutator may cause some brushes to get sticky, which gums the commutator, and the added friction causes excessive heat in face of brush. Keep oil off of commutators and brushes.

Brushes usually carry from 40 to 60 amperes per square inch of cross sectional area. Some, particularly on

slip rings or low-voltage machines, go as high as 80 to 90 amperes per sq. inch.

Twelve brushes on 4 brush studs means 2 positive and 2 negative studs, or 6 brushes per terminal to carry live current. At 166 amps., this means 28 amps per brush. At 40 amps per sq. in. this would require .7, or, say, $\frac{3}{4}$ sq. in. area. They could be, then, say $\frac{1}{2}$" x $1\frac{1}{2}$", or $\frac{5}{8}$" x $1\frac{1}{4}$" brushes. To remove one brush increases the load on the remaining 5 by ratio of 6/5, or 20 per cent, or about 60 amps. per sq. in. This may not damage them at once, but might eventually cause trouble. However, some brushes will run satisfactorily at 60 amps. per sq. in.

Removal of one brush is satisfactory in an emergency, but must be replaced at earliest possible moment.

Brushes on studs of one polarity are all in parallel, regardless of the number of studs. Thus, if 2 positive studs of 3 brushes, the removal of one brush in one stud would not warrant removal of one brush on another stud.

QUESTION

We have been reading of the power possibilities of U235. What will be its effect on the marine power plant?

A. J. D., San Francisco.

ANSWER

Some of the popular scientific articles have overstressed the future possibilities of atomic energy as applied to controlled power uses.

Some of the highlights of the broad subject are as follows:

Theoretical physics, backed by experimental evidence as far as possible, indicates that there is an unbelievably large amount of energy stored in the basic structure of all matter, the atom. The theoretical amount is equal to the energy which would be required to accelerate matter to the velocity of light, approximately 186,000 miles per second. If this amount were liberated from a sample of matter, its substance would be disintegrated into absolute nothingness. Thus we could trade a pound of matter for millions of horsepower hours, but the matter would be lost forever.

Some German scientist recently discovered that an isotope of uranium would give up a portion of this atomic energy if split into two lighter atoms of boron and krypton. Although only a portion, the amount is tremendously large ,a pound yielding 5,00,000 times as much as a pound of coal.

An isotope of any element is an atom which has a weight nearly the same as the atomic weight of the element, but not quite the same. The intermixtures of isotopes in matter accounts for the fractional atomic weights noted in most elements. Thus the atomic weight of uranium is about 238, but not exactly. A fraction is involved. We now know that some of the atoms in a sample of uranium weigh only 235 times as much as the hydrogen atom. There is another isotope of uranium also slightly different. It is the U235, which seems to fracture easily under bombardment and release its energy. Other forms of matter have not been fractured to any extent yet.

The problem, then, is to sort out the isotope U235 from the metal U238 in large enough quantities to be able to experiment with. This is extremely difficult and laborious. Only the minutest quantities are yet available.

In any event, it is apparent that if some degree of success is obtained, the energy will be released, to be absorbed in water to make steam, so that the marine engineer need not fear for his main engines and boilers.

There is little likelihood of this form of energy being available to power plants for many years to come.

Engineers' Licenses for August

Name and Grade	Class	Condition
SAN FRANCISCO		
L. S. McNeill, Chief	SS, any GT	RG
F. Deutsch, Chief	SS, any GT	RG
J. Connal, Chief	SS, any GT	O
V. G. Christopher, 1st Asst.	SS, any GT	RG
K. L. Mills, 1st Asst.	SS, any GT	RG
R. E. Townsend, 1st Asst.	SS, any GT	RG
J. A. Richlin, 1st Asst.	SS, any GT	RG
O. Jensen, 1st Asst.	SS, any GT	RG
R. S. Guerard, 2nd Asst.	SS, any GT	RG
C. L. Stapp, 2nd Asst.	SS, any GT	RG
E. O'Neill, 2nd Asst.	SS, any GT	O
W. Stacom, 2nd Asst.	SS, any GT	O
C. E. Hoffman, 2nd Asst.	SS, any GT	O
A. L. White, 3d Asst.	SS, any GT	O
W. D. Starck, 3d Asst.	SS, any GT	O
A. B. Mock, 3d Asst.	SS, any GT	O
H. C. Reeks, 3d Asst.	SS, any GT	O
SAN PEDRO		
J. Law, Chief	SS, any GT	RG
J. Thomassen, 1st Asst.	SS, any GT	RG
M. E. J. Bredlau, 3d Asst.	SS, any GT	O
R. W. Bruwning, 3d Asst.	SS, any GT	O
J. C. Hage, 3d Asst.	SS, any GT	O
G. E. Niemyer, 1st Asst.	MS, 600 GT	O
PORTLAND		
C. P. Darhy, 1st Asst.	SS, any GT	RG
S. D. Gibson, 1st Asst.	SS, any GT	RG
E. C. Steers, 2nd Asst.	SS, any GT	RG
H. L. Wilson, 1st Asst.	SS, any GT	RG
JUNEAU		
W. L. Dolgner, 3d Asst.	MS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

Deck Officers' Licenses for August

Name and Grade	Class	Condition
SAN FRANCISCO		
W. J. Wagner, Jr., Chief	SS, any GT	RG
R. G. Wilson, Chief	SS, any GT	RG
N. Barbara, 2d Mate	SS, any GT	RG
G. E. Haskell, 2d Mate	SS, any GT	RG
B. B. Brown, 2d Mate	SS, any GT	RG
L. K. Hail, 2d Mate	SS, any GT	RG
E. D. York, 2d Mate	SS, any GT	O
D. E. Wilson, 2d Mate	SS, any GT	O
R. R. Seaman, Jr., 3d Mate	SS, any GT	O
A. R. Tobin, 3d Mate	SS, any GT	O
J. J. Guidici, 3d Mate	SS, any GT	O
O. J. Cloward, 3d Mate	SS, any GT	O
SAN PEDRO		
H. A. Johnson, Chief	SS, any GT	RG
D. M. Cuwley, 2d Mate	SS, any GT	RG
R. H. Abbott, 3d Mate	SS, any GT	O
L. C. C. Meeker, 3d Mate	SS, any GT	O
PORTLAND		
W. F. Douglas, 2d Mate	SS, any GT	RG
SEATTLE		
D. F. Johnson, Chief	SS, any GT	RG
A. Zeuch, Chief	SS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

A New Mackay Service Station

The Marine Division of the Mackay Radio and Telegraph Company has opened a new service station at Baltimore, Md. The personnel is headed by J. A. Richardi, inspector in charge.

According to W. V. Russ, marine superintendent of the company:

"The demands of our own expanding activities in this region of the Atlantic Seaboard, and the rapidly growing importance of the Port of Baltimore, have necessitated further expansion of complete repair, maintenance and installation facilities at Baltimore for Mackay Radio.

"As to the installation factor, there are sixteen ships building in the yards at or near Baltimore which are to be equipped complete by Mackay Radio, and the new office and personnel will aid considerably with these contracts. Furthermore, it will offer local and visiting shipowners Mackay Radio's new line of radio equipment, direction finders and the auto alarm."

The Baltimore station is number 17 for Mackay Radio, with the others at Boston, New York, Philadelphia, Norfolk, Jacksonville, Miami, Tampa, New Orleans, Galveston, San Diego, Los Angeles, San Francisco, Seattle, Portland, Ore.; Honolulu and Manila, and through associated companies, Mackay Radio has servicing facilities in ports throughout the Western Hemisphere and in other parts of the world.

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

By "The Skipper"
Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California.

Cargo and Stowage

IV SOME SPECIAL CARGOES

Where would you stow the following kinds of cable: (1) large chain cable (2) electric cable (3) submarine cable?

(1) Large chain cable should be stowed athartship on the skin of the vessel in the lower hold, if possible. If evenly stowed, it should make an excellent base upon which to stow heavy general cargo.

(2) Electric cable is lead- or rubber-covered cable wound on drums, the larger of which generally weigh several tons and require careful handling and stowage. They should be stowed on the skin of the vessel or deck, and fore and aft, if possible. If not blocked off with other cargo, they should be well lashed, as may be done to the surrounding cargo.

(3) Submarine cable is usually coiled down in a special tank erected in the hold, after which the tank is filled with lime water. Care should be taken to avoid damage to other cargo in the event of the tank's leaking.

Where should calcium chloride be stowed?

This is not a dangerous article if properly packed in air-tight drums, and should be stowed in a dry, airy place in a deck away from any foodstuffs and acids. It is usually shipped in barrels or iron drums, and care should be exercised to see that the barrels are not leaking before shipment. They require careful handling and stowage according to the method of packing, remembering that this substance absorbs moisture from the atmosphere, and will liquefy.

What precautions should be taken when stowing camphine?

Camphine is a very dangerous liquid, and, owing to its highly inflammable properties, the utmost care should be taken to keep lights away from its vicinity, smoking, etc. It has also the additional property of being one of the strongest-smelling articles likely to be offered for shipment; the smell persists long after the stuff itself has been removed. For this reason, it is not at all suitable for underdeck stowage in a vessel likely to carry fine goods shortly after, and owing to its extreme inflammability, its carriage on deck is attended with considerable risk.

There is great diversity of opinion as to the maximum number of heights of casks which should be allowed in the hold. My opinion is that this depends entirely on the quality of the casks, which varies considerably, and also on the manner in which they are stowed. The bottom tier should be carefully bedded on two beds in order that the bilge may be clear of the floor and well chocked. The ground tier should not be allowed to ride on any projecting frame, stringer or angle, but should be kept well clear on the side, the space filled up with cordwood and securely blocked off to prevent the slightest movement. After the first tier is laid, I favor what is termed "solid stowage," that is, bilge and cantline stowed half cask. By this means each cask rests on four casks beneath it; but the greatest care must be taken to see that the heads are absolutely perpendicular, otherwise shifted heads will be the result. In all cases it is necessary to see that the chimes of the side casks do not rest on any beams, angles, etc.

Needless to say, with a ship carrying camphine special precautions should be taken against fire. Ventilation should be properly attended to, as it has been found at times impossible to continue working in the hold, owing to the gas from leaky barrels. No other cargo that is liable to be affected by the very strong odor should be stowed in a hold with camphine.

Where and how should camphor and camphor oil be stowed, and what precautions taken?

Camphor is a white crystalline substance from the camphor tree. It is used for medicinal purposes, and is added to illuminating oil to increase the brightness. A large quantity is shipped to Europe from China and Japan in casks, cases and drums. It should be stowed in a perfectly dry place, and great care must be taken when allotting space for the carriage of camphor, as the odor is so pungent

that it is liable to damage other cargo to a great extent. It is highly inflammable.

Camphor oil is a colorless crystalline mass of characteristic odor, and is highly inflammable. It is distilled from a forest tree of Japan, Formosa and China. The normal oil is in a semi-solid state, owing to the excess of camphor. When this excess is removed, the liquid portion is the "camphor oil" of commerce. The oil is highly volatile. Should not be stowed in holds. Stow in a dry, well-ventilated peak, and if essential oils are stowed in the same compartments, stow camphor oil below and not over essential oils.

How should canned goods be stowed, and of what would you be particularly careful?

This covers all canned meats, fish, fruits, jams, etc. They are usually shipped in cases varying considerably in size, and should be given good square stowage, if possible, or they may be used as good beam fillings or broken stowage, providing they are carefully placed. Many canned goods are packed in frail and light cases, which require careful handling, otherwise many packages are broken and risk of pilferage increased. They should be worked on boards or trays where possible. Do not stow along with cargo liable to sweat and throw off moisture, including newly-sawn or wet lumber. Heavy claims have been paid for damage to the tins through the action of moisture rusting them. Special stowage should be arranged to avoid pilferage.

How and under whose personal supervision is case oil stowed?

Holds must be thoroughly clean and provided with adequate means of ventilation before they will be accepted as fit to receive case oil. Clean dunnage only will be accepted, this class of cargo requiring more dunnage than almost any other.

In nearly all ports in the U. S. A., case oil is loaded under the personal direction and supervision of a surveyor appointed by the New York Board of Underwriters, who will insist on cases being stowed according to certain rules formulated as the result of many years' experiment and practical experience. But the fact that the stowage is carried out under this supervision does not entirely exonerate or relieve the ship of the responsibility of taking due care for the preservation and good carriage of all cargo.

Although the above-mentioned surveyor is careful to see that the cargo is loaded in such a manner that it is properly stowed, he has no interest whatever in the number of cases taken in a given capacity. In calculating the space for stowage of case oil, one can fairly safely reckon the stowage capacity as 2 cu. ft. per case. This is over the whole vessel. In large ships, in say the middle holds, cases will often stow in less space than this; on the other hand, in the end holds and in smaller compartments it will require considerably more space for stowage.

In stowing case oil, the greatest care must be taken to keep all the tiers perfectly level. For example, when the ground tier is being laid, the cases must not be extended the slightest degree into the turn of the bilge or into the "run," where it is necessary to cant one corner. Such stowage would necessarily place additional pressure on the one corner of the case and certainly damage it, and might even "break" the whole stowage in a hold. The tier should be started from amidships, or in the after holds alongside the tunnel and worked towards the wing. Immediately the floor starts to rise, the space should be left, filled in with dunnage, and the next tier carried out over this, still keeping the line of cases perfectly level.

It is always customary to floor over the first tier, and in deep holds to floor again after about the fifth or sixth tier.

Cases must on no account be stowed on their flats, except occasionally between the beams on the top tier, where there is not room for an upright case.

Case oil should also be exceptionally well "blocked off" with wood, as the slightest movement when the vessel is rolling will cause chafage and much leakage.

The authorities in most countries require to satisfy themselves as to the flash point of case oil before granting permission for discharge to commence, for which purpose they demand samples of each brand to be sent on shore. Time will be saved by arranging for a sample case of each brand to be on hand for landing immediately on arrival.

Petroleum products give off vapor at ordinary temperatures, which, when combined with air, forms an explosive and inflammable mixture. The use of naked lights, smoking, etc., should never be allowed in or near compartments containing case oil. Ventilation of holds by means of cowl ventilators should receive constant attention.

Before receiving any delicate or edible goods into a compartment which has recently contained case oil, all oil stains should be removed by the use of limewash, and bilges thoroughly cleaned and washed out.

How and where are cattle carried?

Most countries have stringent laws governing the carriage of cattle. These rules should be obtained by the master before loading, and strictly complied with. The regulations of the U. S. Department of Agriculture, prepared by the Bureau of Animal Industry, are very comprehensive, and should be carefully studied by the master and mates of all vessels engaged in the carriage of cattle.

Cattle are not to be carried on more than three decks, and when desiring to carry them on the third, written permission must be obtained from the inspector of the port.

Export animals must not be carried on any part of the vessel where they will interfere with the proper management of the vessel, or with the efficient working of the necessary lifeboats, or with the requisite ventilation of the vessel, and may be carried only as herein specified.

Cattle pens must have 6 feet vertical space by not less than 8 feet in width on all decks free of all obstructions. Cattle may, however, be placed on raised floors over pipes and other similar obstructions where the vertical space is not less than 5 feet 6 inches from under edge of beam overhead to flooring underfoot. Cattle over 850 pounds in weight must be allowed a space of 2 feet 6 inches in width by 8 feet in depth, and no more than 4 head of such cattle will be allowed in each pen, except at the end of rows, where 5 may be allowed in each pen. Calves and young stock,

yearlings, may be stowed at the discretion of the inspector.

Of what must you be careful in accepting and stowing China wood oil?

China wood oil is obtained from the nuts of the tung tree, extensively grown in North China, Japan, etc. It is mostly shipped in second-hand containers, i. e. kerosene cans in cases, drums and barrels. The leakage of this oil is considerable, and sometimes very heavy, resulting in large claims. A very sharp watch should be kept, when loading this cargo, to detect leaky barrels and those which have been but temporarily stoppered or patched up. It not infrequently happens that the proportion of barrels brought alongside which are leaky is very high. All leaky packages should be ruthlessly rejected.

Special care should be exercised in stowing, and plenty of suitable dunnage should be at hand; odd-sized barrels should be laid aside so as not to break the stowage, and later placed in the top tier.

Avoid stowing too many heights; never exceed six with second-hand containers; five tiers is enough in the case of some barrels.

Overstow with the lightest cargo after boarding the barrels, etc., over to keep cargo above from oil damage.

What is the greatest risk in the carriage of a cargo of coal, and how would you guard against it?

The greatest risk in the carriage of cargo of coal is fire and explosion, the loss of many lives and fine vessels being due to these causes.

Coal requires special care as regards ventilation, it being very liable to spontaneous combustion. Surface ventilation is absolutely necessary and must be given at all times, and in addition to the ordinary fixed hold ventilators, hatches should be opened, if possible, in fine weather, at any rate during the early part of the voyage.

Coal emits an inflammable gas, particularly immediately after loading and when newly-worked or freshly broken, which gas, when mixed with a certain proportion of air, will quickly explode if brought into contact with a spark or light.

The heating of coal, and consequent risk of spontaneous ignition, does not proceed from the presence of the gas, such being caused by absorption of oxygen from the air, the absorption being greater at high than at low temperature, this in time causing more gas to be evolved.

No additional risk of fire need be apprehended on account of coal being shipped in a wet condition or becoming so in the course of the voyage.

Coal taken on board during wet weather will sometimes turn out as much as 3 per cent short.

How would you stow a cargo of coffee?

Coffee is the fruit of the coffee tree, which is cultivated in hot climates, and is largely used as a beverage.

The great bulk of the world's supply comes from Brazil, and is usually shipped in bags in full cargoes. When carried as part of a mixed or general cargo, care must be used to stow it well away from any cargo such as turps, guano, etc., which would easily damage it by taint. It should be well dunnaged, matted and ventilated.

A sharp lookout should be kept for slack bags, especially when receiving from lighters, which should be well searched for hidden bags before signing mate's receipt.

What precautions must be taken with a cargo of copra?

It has a stale oily smell that would damage food products if stowed near them. Shipped in bulk, bales, bags and cases, it must be loaded in a dry state, and in consequence of being very inflammable, precautions must be taken against fire, though this cargo does not appear to be more liable to spontaneous combustion than many others. Copra when carried in bags is sometimes sliced into small pieces. It usually loses 2 to 3 per cent in weight on a long voyage.

When shipped in bulk, copra may be treated as an ordinary bulk cargo, with the exception that great care must be taken as regards ventilation.

A small insect called the copra bug breeds prolifically in some cargoes of copra, and they have been known to make life almost unbearable for ship's crews. It is advisable upon the first signs of these insects appearing to cover all ventilators, etc., with wire gauze or muslin.

How would you stow cotton, and what precautions would you take to prevent fire?

Adequate dunnage and mats should be used, and all iron in the compartment to be used for cotton should be well covered with burlap or mats. Care should be taken to stow bales of cotton well away from any oily or greasy goods, and if the hold has been recently painted, it must be ascertained that this is thoroughly dry before taking any of the bales on board.

Cotton which is or has been in contact with oil or grease is very liable to spontaneous combustion, for which reason holds, and especially spar ceilings, should not be painted shortly before loading cotton, unless it is certain that there is sufficient time for the paint to harden before cotton is stowed up against it.

Wet cotton, if stowed in a confined space, will heat and deteriorate, but no danger of spontaneous ignition is to be apprehended.

During the loading, all precautions must be taken against fire, hoses should be connected and ready for use, "No Smoking" notices exhibited, and all galley funnels should be gauze-covered to prevent sparks reaching the cargo.

Before commencing to receive cotton, the steam or chemical fire extinguishers should be thoroughly overhauled, and one should be fitted on every cotton carrier.

In the event of a fire breaking out in a cotton cargo at sea, prompt measures are necessary. Batten down and close all apertures by which air may find its way into the holds; turn on the steam, which should be kept going continuously; do not play water to cool the decks when they get hot (as they will do), as this only condenses the steam, and by producing a partial vacuum causes circulation of air in the hold, which will assist and spread the fire; for the same reason, water should not be played into the hold while steam is in use.

In all cases, bales of cotton require to be carefully stowed, and the hold measured before and during the operation in order to ascertain how many heights will fit in, so that arrangements can be made to stow the bales on their flat, edge or end, to ensure the greatest number being carried in the compartment.

New Two-Drum Marine Water Tube Boilers

For New Tankers of Texas Company

The Babcock & Wilcox two-drum marine boilers for four new Texas Company tankers have several features of design not previously incorporated in boilers of this type. There are two boilers per vessel, each having a normal capacity of 41,000 pounds of steam per hour at 450 pounds pressure and 750 degrees steam temperature at the superheater outlet. Either boiler can deliver 82,000 pounds of steam for operation of the vessel at normal power, with practically the same pressure and temperature conditions at the superheater outlet. This was a requirement in the specifications for the boiler equipment for these tankers, and, with the design used, this capacity can be met satisfactorily and dry steam passed to the superheater over the entire range of operation.

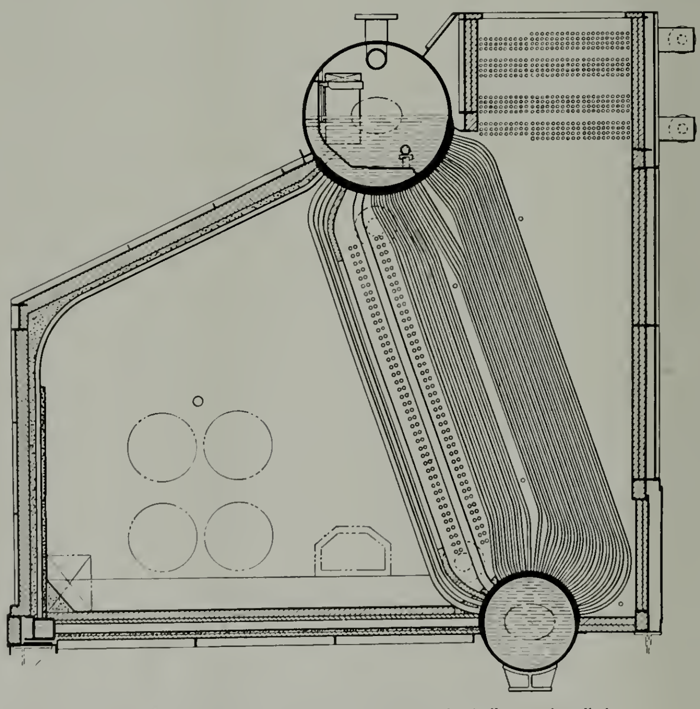
The boilers, which are fitted with economizers, are of the single gas-flow type, without baffles of any kind. Elimination of baffles in the design minimizes the accumulation of soot and other deposits, and permits the gases to flow across all the tubes, thus utilizing the entire boiler surface to the best advantage for maximum heat absorption with resultant higher efficiency.

The steam drum of each boiler is 46 inches in diameter and the water drum is 30 inches in diameter. They are connected by a generating bank consisting of 2-inch diameter tubes in the waterscreen below the superheater and 1¼-inch diameter tubes above the superheater.

For water cooling on the sides and roof of the furnace, Babcock & Wilcox stud-tube water-wall construction is used, with the pattern suitably arranged to maintain the proper furnace temperature for high combustion efficiency. Front and rear walls are fitted with Babcock & Wilcox Junior Firebrick. A row of tubes connecting the water drum and the single water-wall header, with firebrick covering the tubes, composes the furnace floor.

The superheater is arranged with the headers at the rear of the boiler, and sufficient space is provided at the front of the boiler for inspection and replacement of any of the tubes. Superheater tubes are of the "U" bend type, expanded into the superheater headers with the tubes arranged in-line so that they can be cleaned externally. These tubes are supported by a water-cooled support connected between the upper and lower drum and the tubes maintained in alignment by an alloy spacer plate.

A Babcock & Wilcox design economizer is installed in the boiler uptake with the headers located at the rear of the boilers. The tubes extend the depth of the setting and are arranged in-line. They are one-inch in diameter,



Babcock & Wilcox two-drum marine type water tube boilers as installed on Texas Company tankers.

of the "U" bend type, and of a wall thickness that will insure long life. In general, the design is similar to that of economizers that have been in service for eight years, and have given exceptional service without any maintenance cost.

These boilers are double cased, and the air for combustion passes down the back, side and below the floor of the boiler to the burners.

Arrangement of the heating surfaces, including water wall, boiler and economizer, together with the air casing around the boiler, results in a unit that is highly efficient, accessible, and at the same time comfortably cool for the operator.

Setting the boilers in the fireroom is arranged with the drums fore and aft. There is a 4-foot aisle between the two boilers, which permits access to all sides of the boiler. Inspection panels are fitted on the inboard side casing of each boiler in the zone of the lower drum. These can be readily removed in the aisle between the boilers to permit inspection and cleaning of the external surface of the lower drums and the tubes where they are expanded into these drums. The two-drum type of boiler requires inspection along the entire length of the drum at intervals to prevent excessive soot deposits that might eventually cause corrosion of the drum and tube surfaces, or become a fire hazard. Suitable access doors are installed in the zone of the furnace, superheater and economizer for inspection of these surfaces.

In order to insure dry steam and satisfactory circulation characteristics over the entire range of operation, the boilers are fitted with Babcock & Wilcox cyclone steam separators in the steam drum. These steam separators not only insure solid water for the downcomers, but permit considerable variation in the water level without affecting the quality of steam. The cyclone separators eliminate water carryover into the superheater, and thus preclude scale forming in the superheater tubes, which would eventually cause failures if the tubes were not kept clean.

Each boiler is fitted with four Todd oil burners for operation with forced draft, and the entire unit is operated under Bailey Automatic Combustion Control.

The exterior of the surfaces is cleaned mechanically by Diamond soot blowers, using four Valv-in-Head soot blowers in the generating bank and two in the economizer of each boiler. There are also two retractible soot blowers mounted in the furnace, one located in the roof and the other in the rear wall. These retractible soot blowers will keep the water screen and superheater surfaces free from slag deposits, inasmuch as they will clean the surfaces on the furnace face, where slag and other deposits usually collect.

Feed water regulators of the Bailey Thermo Hydraulic type are used to control the feed water.

The first of these new tankers, the S. S. Ohio, is now in service, and all indications point to a highly successful operation.

The Sabotage Fire Threat

by John Kidde

With America's industrial structure already being weakened by fire at the rate of more than $10,000,000 a month, and with the threat of "speed-up" and sabotage fires greater than at any time in American history, this year's Fire Prevention Week, from October 6 to 12, has a far greater significance than ever before.

No country that accepts foreign war orders can hope to escape sabotage fires. Factories engaged in our own national defense orders are also the target of saboteurs and foreign agents, and because these "torches" are better organized and more ingenious than ever before, industry must perfect its fire defenses lest its military defense program bog down. With their surprising knowledge of America's independent production set-up, saboteurs can tie up entire industries by putting the torch to a "bottle-neck" plant, or merely to a department performing a single vital operation on a product.

The effectiveness of fire as an industrial wrecker is shown in the tactics of European bombers. Incendiary bombs are used even more widely than high explosives, and their targets are almost always factories. And the "bombs" of saboteurs—ingenious devices such as self-obliterating lead tubes containing fire-setting chemicals —have an even better chance of achieving their purpose because they are totally unexpected.

Speeded up production is another source of fire danger which factory men should watch. During periods of frantic war preparation when new plants are put up almost over night, and management concentrates on maximum output, normal precautions are often ignored and fire hazards are allowed to exist.

Although most of America's industrial fire loss so far has been the work of "General" Carelessness, many manufacturers depend upon antiquated extinguishing equipment, which has been rendered obsolete by vast changes in our industrial production methods.

Synthetic rubber, lacquers, high-test gasoline, diesel fuels, new solvents, chemicals used in plastics, synthetic finishes, acetate and rayon yarns and the infinite variety of solvents and petroleum products, are a few of the materials and processes which have posed new problems in fire protection in recent years. And when one adds to these munition plants, airplane and engine plants and a host of chemical factories, all working at top speed, the opportunity for crippling fires is immensely broadened.

Manufacturers are urged not to embark on "witch-hunts" among their employees, but rather to follow three simple steps.

First, institute a campaign for top-notch plant housekeeping, to eliminate unnecessary hazards and careless habits.

Second, teach employees how to fight fires, organize fire bridgades and stage frequent fire drills.

Third, analyze the hazards in plants and warehouses, and adopt the most advanced fire safeguards. In this last step, the advice of insurance men, fire department officials and manufacturers of fire protection equipment can be of great help.

Radio Wiring
for Today's Merchant Vessels

by F. A. Klingenschmitt

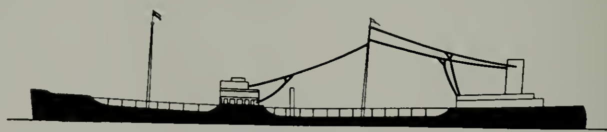
Amy, Aceves & King, Inc.
Engineer Specialists in Antenna Systems

Radio wiring has become a standard feature of the modern cargo ship. No better confirmation of this statement could be found than the installations now being made on Maritime Commission ships under construction in San Francisco Bay. And in other shipbuilding centers as well, ship after ship is being provided with radio wiring whereby the usual broadcast receiver or all-wave set may be plugged into a convenient outlet for ideal reception, while the ship's deck and superstructure are kept clean of that maze of wires which would otherwise be required in entertaining the crew while in port or far out at sea.

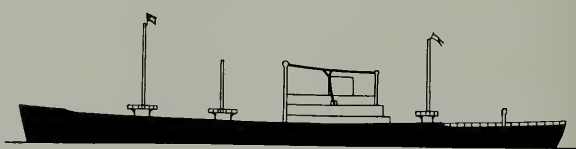
The multicoupler-antenna system is nothing new, at least so far as its land application is concerned. For years past, the better apartment houses have served their tenants with radio outlets for the required antenna-ground connections of their sets. A dozen to fifteen outlets operate off a single neat aerial on the roof, which accounts for the disappearance of the erstwhile jungles of poles, wires, guys and other dangerous and unsightly obstructions.

Some time back, the multicoupler-antenna system was tried aboard ship. The standard equipment did work, and promised to be the answer to marine radio entertainment, but it soon became apparent that certain changes would have to be made to meet the peculiar and extra-rigorous conditions involved. Provisions would have to be made for the constant vibration and high winds to be withstood by the aerial. The corrosive action of salt air and sulphurous fumes from the nearby ship's funnel would have to be countered by the use of suitable wire and metal fittings. The proximity of a powerful radio transmitter likewise called for special antenna transformers with extra insulation between windings, so as to overcome the voltage breakdowns encountered in the earlier installations. And so the marine multicoupler-antenna system was developed. With over seventy installations already completed or contracted for, the system is no longer an experiment, but has become standard marine wiring practice, especially aboard Maritime Commission ships of the C-1, C-2 and C-3 classes, as well as many oil tankers.

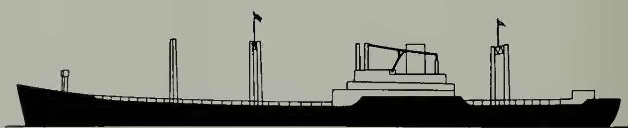
Now the idea of the multicoupler-antenna system is simply to make a single, neat, highly-efficient aerial serve a number of individual radio receivers. Each receiver has full freedom of action, being tuned to any desired program, without the slightest interference with or from other receivers operating on the same aerial. Also, the aerial and the radio transmission line bringing the signals to the plurality of outlets are designed and installed so as to minimize background noises or so-called man-made static, arising from the ship's electrical



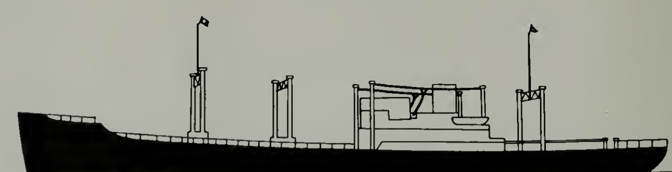
OIL TANKER
MULTICOUPLER ANTENNA RIGGING



C1-B – CARGO SHIP
MULTICOUPLER ANTENNA RIGGING
(TWO AERIALS REQ'D. ONE SHOWN)



C2 – CARGO SHIP
MULTICOUPLER ANTENNA RIGGING
(TWO AERIALS REQ'D. ONE SHOWN)



C3 – CARGO SHIP
MULTICOUPLER ANTENNA RIGGING

equipment. This system provides what is popularly known as "noiseless" reception.

Aside from ideal radio reception of either broadcast programs while in port or within the limited service range of such stations, or short-wave transmissions when far out at sea, the multicoupler-antenna system clears the ship's deck and superstructure of troublesome aerials. No longer is the skipper faced with having his radio direction finder thrown off by nearby aerials. With one good aerial serving up to twenty-one sets, not more than two or three aerials at most will be needed for the largest tanker or cargo ship. Take the tanker Esso Nashville, for example. This ship has three multicoupler-antenna system aerials, serving a total of 33 radio outlets. Two aerials are strung between the aft mast and the funnel near the stern, with the third aerial between superstructure amidships and the aft mast. The port side aerial handles 13 outlets, the starboard aerial handles 11 and the forward aerial 9.

The installation of the multicoupler-antenna system can be handled by usual marine electricians. First comes the aerial, which follows good marine radio practice. 7/18 phospor bronze wire is used for the doublet antenna with its two arms each 30 to 50 feet long, joined together at the center by a combination of porcelain insulators, and connecting with a twisted-pair downlead of special Dura-cord cable to withstand severe weathering. The downlead joins the antenna transformer, housed in a galvanized steel box mounted on a bulkhead stanchion or mast, and containing the lightning arrester as well. So much for the aerial end of the installation.

The radio outlets, conveniently placed throughout the crew's quarters and in the officers' staterooms, are joined in parallel by a concentric dual conductor cable or riser placed either in the usual conduit or exposed. Several kinds of such cable are available and approved for the purpose. Lead sheathing over the cable is not essential, but it does afford better mechanical protection. Such protected cable requires more care in its installation, since it must be supported by clamps every few feet.

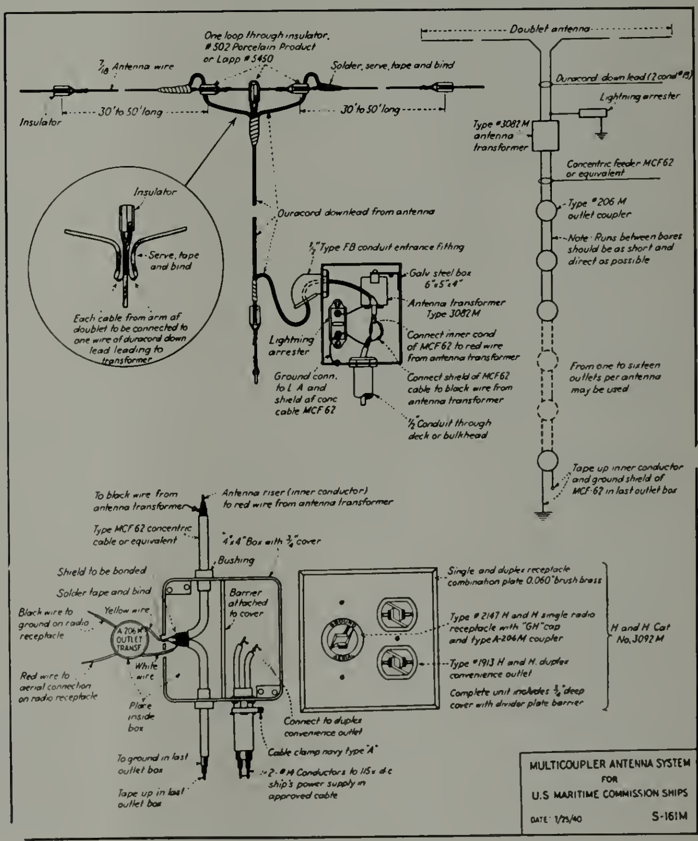
The radio outlets comprise the usual 4- x 4-inch box with ¾-inch cover, to take the outlet transformer which joins with inner and outer conductors of the radio transmission line. The face plate has a special antenna-ground receptacle that takes a special plug, which in turn connects with the antenna-ground terminals of the receiver, as well as two standard convenience outlet receptacles for plugging into the ship's power supply. Although other outlets are available, about 75 per cent of the installations so far utilize the radio and duplex outlet receptacle arrangement mentioned.

In order to keep the runs between radio outlets as short as possible, the radio lines are ingeniously zigzagged from spot to spot and from deck to deck. Owing to the great variation of marine architecture, no set forms governing actual installation can be given. It is advisable, therefore, that blue prints of a given ship be submitted to the radio engineers so that a correct wiring layout may be supplied.

The importance of radio wiring aboard ship can hardly be exaggerated. Use of radio receivers on shipboard has become almost universal. However, the satisfactory use of sets requires special planning. Boats traveling to distant points make proper reception of short-wave transmissions a necessity.

On shipboard, loops and other built-in antennae will not operate, due to the almost perfect screening of radio waves by the all-metal construction of the vessel. External aerials must be used, and nothing but the most efficient kind of aerial will do if satisfactory short-wave reception is to be enjoyed far out at sea.

With the multicoupler-antenna system, the crew and officers are assured of satisfactory results from their broadcast or all-wave receivers. Furthermore, the sets may be taken from one part of the ship to another, and plugged in for the same satisfactory uniform reception results.



Brine Well Circulation and Engine Room Ventilation

On Baby Tuna Clippers

by David W. Dickie, N. A.

There has been a tendency lately toward using a separate coil in each well for cooling the fish cargoes of the tuna clippers. This system was worked out nearly two years ago to compete with the Pak-Ice system.

Table 5 of the November, 1939, article in *Pacific Marine Review* gave the figures cooling 3 batches in the brine tank. The purpose is to cool 17,000 pounds of sea water from 86 to 28 degrees for the well where the fish are to be stowed. Toss in the fish, keeping the water cool by circulating it through the coil. A second batch of sea water (17,000 pounds) is cooled in the brine tank and put in the well when the first batch is pumped overboard. A third batch (19,000 pounds) of 22 per cent brine is cooled in the brine tank and put in the well when the second batch of sea water is pumped overboard.

Nothing is gained by using any further changes, unless the fishermen go back to the system of cleaning the fish by removing the head and entrails, such as was done several years ago. Cleaning the fish produces the light-colored flesh.

The coil system is less efficient than the Pak-Ice system if both are installed properly, because 1 pound of sea water or 22 per cent brine has a cooling effect of less than 1 British Thermal Unit per degree Fahrenheit, while melting 1 pound of ice from the Pak-Ice machine is equivalent to 144 B.T.U.

Hence it is necessary to circulate considerably more sea water using the coil system than with the slush ice system. Two methods of installing the coils are shown. In each case three Frick double V.W. coils are placed one above the other with the valves in the alleyway.

On one side is shown the down draft system by using the circulator to draw the water from the coil and force it up through the fish, and on the other the circulator takes the water from the lower inboard corner of the well and forces it up through the coil. The down draft system is more convenient in so far as the arrangement of the valves in the alleyway is concerned.

The principle of the circulator was discussed in the May, 1940, *Pacific Marine Review*, and it will circulate over three times the water, using the same power as can be obtained with a pump. It requires more power for the circulator with deep submergence than when it is near the surface. A three-horsepower motor is shown.

When the individual coil system was first proposed, no difficulty was anticipated in transferring the heat from the brine to the refrigerant in the coil, as it was possible to secure lively circulation of the brine past the coil by installing it in a restricted passage and arranging baffles to distribute the flow evenly over the coil.

The design of the well was changed so that the top surface became about 80 square feet, and a depth of one foot gave 80 cubic feet, of which 64 cubic feet will be fish and 16 cubic feet brine, or 120 gallons of brine. Therefore the quantities of water necessary for various rates of flow will be those indicated in the table herewith.

Ft. Per Minute	Gals. Per Minute	Ft. Per Minute	Gals. Per Minute
1	120	10	1200
2	240	11	1320
3	360	12	1440
4	480	13	1560
5	600	14	1680
6	720	15	1800
7	840	16	1920
8	960	17	2040
9	1080	18	2160

When the brine circulator which delivers 1950 gallons per minute with 3-horsepower was worked out, it became possible to get a perceptible movement of the brine through the fish, but if a pump delivers only 600 gallons per minute, the velocity is slow and the theoretical heat transference from the fish to the brine is low.

A cube was laid off with the fish in it, and it was found that for each cubic foot in the well there was 5.6 square feet of fish surface. As the fish are in contact with each other, not all of the fish surface is available to transfer heat from the fish to the brine, but 3 square feet of active fish surface per cubic foot of stowage would be a closer approximation.

The velocity of the brine past the coil is 90 to 100 feet per minute, while the velocity of the brine past the fish is 16 feet per minute. The surface of the coil is 438 square feet, while the surface of the fish in the well is 1860 square feet, or about 4 to 1.

There should be no trouble with this system, provided that:

(1) The fish are actually brought down to zero. When the 22 per cent brine shows a temperature of zero it does not necessarily mean that the interior of the fish all through the well has been brought down to zero. There may be pockets here and there that have not been properly cooled.

(2) The attractive feature of the coil system, notwithstanding its inefficiency as compared with the slush ice system, is the fact that the 22 per cent brine can be pumped overboard and the fish brought home dry. The 50 to 60 tons capacity saved by pumping brine overboard can either be used to bring home more fish or lighten the boat and increase her speed.

The fish dry out somewhat in transit, as it is difficult to regulate the humidity in the well. The circulator is kept running when the well is pumped out to circulate air through the fish and coil to maintain the low temperature.

(3) If the fish are not properly frozen, the pressure of the fish from above, and the rolling of the boat, will cause considerable loss from grinding, and the bruised fish will start to decay in spite of the low temperature.

(4) If the voyage lasts 20 or more days after the first fish are caught, the coil will ice up solid from the action of the air from the circulator, and it will require to be thawed with water from the fire hose when the well is discharged.

(5) If the fish have not been properly coated with a film of ice, the air will oxidize the fat and oil, producing free fatty acid, and when the fish are exposed to light and air the fats will turn rancid.

Ventilation

Ventilation of the engine room is always a problem on a tuna boat. The outside air temperature is 100 degrees, and with three diesel engines adding heat and releasing gases, additional air is a necessity. The lower engine room contains 5000 and the upper engine room 3500 cubic feet.

If we figure to change the air in the lower engine room once every minute approximately, or both engine rooms once every two minutes, one blower delivering 4400 cubic feet per minute and one exhausting the same amount or a little more is necessary.

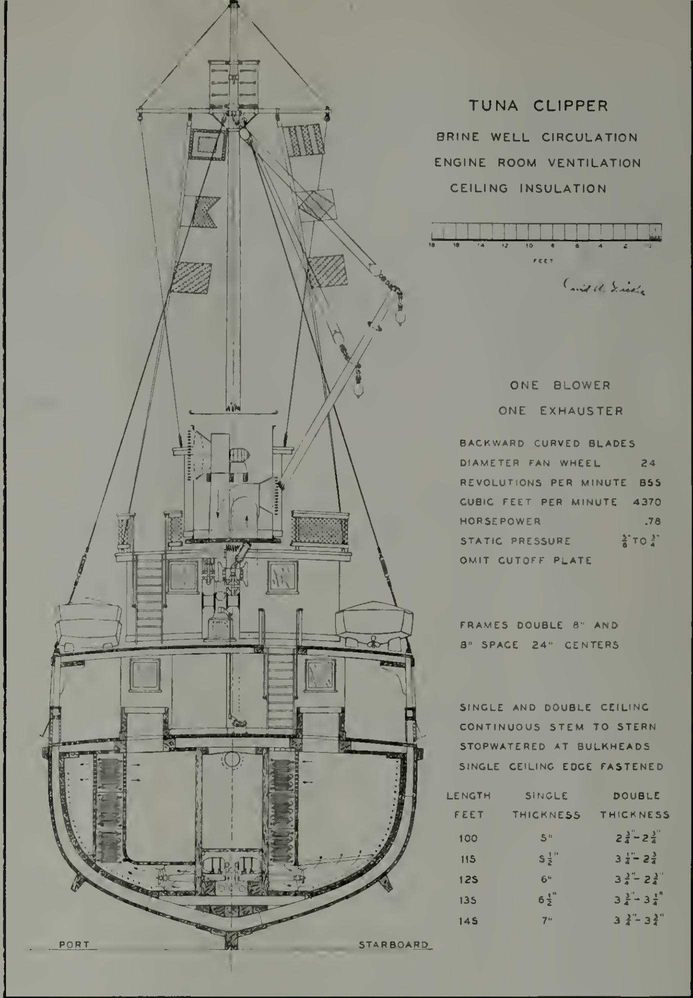
Only 2 to 2½ horsepower can be spared from the electrical supply to be used for the blowers, and to get a blower with the fan wheel mounted on the motor shaft, we adopt 855 r.p.m. Such a blower is about 4 feet high, and obviously there is no room in the engine room for two of them.

The drawing shows two fans mounted in the stack aft of the radio room. The upper fan takes the air in on the port side of the stack and delivers it through a 20" x 20" duct to the engine room, and the lower blower exhausts air from the bottom of the engine room through a 20" x 26" duct and delivers it out through the starboard side of the stack.

As noise is objectionable near the sleeping quarters, the cut-off plates are omitted from the blowers, which reduces the amount of air and the required horsepower a little.

Ceiling Insulation

The easiest practical way to insulate the wells against the entrance of heat from the sea water is to increase the thickness of the ceiling. This is beneficial in two ways: heat absorption is retarded, and by carrying the ceiling the same thickness from bow to stern, it strengthens the boat in the way of the engine room and the propeller shaft, where some of the boats have had trouble. The ceiling has to be stopwatered where it passes the bounding timbers of the bulkheads. There is a choice of using one thickness of ceiling edge fastened, or two thicknesses, the second thickness being fastened through the first into the frames.



As long as the wells are designed to hold 20 tons (2240 pounds) of sea water holding 16 short tons of fish and 4 short tons (2000) of sea water to allow for expansion, the electrical load and refrigeration remain the same as given in the articles, regardless of the size of the boat from 85 feet to 125 feet long overall.

When 125-foot length is exceeded, the size of the wells has to be increased to provide space on the deck for the hatches, and to save cutting the boat into such small compartments. This changes the method of fishing so only one well at a time can be stowed instead of two, thereby enabling the same or even a little less refrigeration to serve the larger boat. In fact, at about 125 feet length overall it is advisable to give wide consideration to the sizes of the wells, because more bait is needed for a great many small catches than for a less number of larger catches. Two wells hold 32 tons of fish, while one large well will hold 22 tons, and in the long run the same amount of bait will catch 32 tons as 22 tons, if they can be caught from a less number of schools of fish.

On the Ways — SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

For September developments in Pacific Coast shipbuilding see lead article on page 24 of this issue. Pacific Coast now has over $700,000,000 in contracts and allocations of new ship construction.

Bids for Ocean Dominion C-2 Vessels

The Maritime Commission announced on September 11 the receipt of bids for the construction of three modified C-2 type with passenger accommodation, single-screw cargo vessels to be built for the Ocean Dominion Steamship Corporation, as follows:

- **Bethlehem Steel Co., New York City (Sparrows Point, Md., Yard)**

	1 Ship	2 Ships Each	3 Ships Each
Fix. P.	$3,972,000	$3,704,000	$3,575,000
Adj. P.	3,454,000	3,221,000	3,109,000

Time for construction: first ship, 730 days; second ship, 760 days; third ship, 910 days.

- **Sun Shipbuilding & Dry Dock Company, Chester, Pa.**

	1 Ship	2 Ships Each	3 Ships Each
Fix. P.	$3,325,000	$3,225,000	$3,190,000
Adj. P.	3,075,000	2,975,000	2,940,000

Time for construction: first ship, 450 days; second ship, 480 days; third ship, 660 days.

- **Moore Dry Dock Company, Oakland, California (3 bids)**

First Bid

	1 Ship	2 Ships Each	3 Ships Each
Fix. P.	$3,400,000	$3,300,000	$3,200,000
Adj. P.	3,150,000	3,050,000	2,950,000

Time for construction: first ship, 450 days; second ship, 480 days; third ship, 660 days.

Second Bid

	1 Ship	2 Ships Each	3 Ships Each
Fix. P.	$3,350,000	$3,250,000	$3,150,000
Adj. P.	3,100,000	3,000,000	2,900,000

Time for construction: first ship, 600 days; second ship, 630 days; third ship, 810 days.

Third Bid

	1 Ship	2 Ships Each	3 Ships Each
Fix. P.	$3,300,000	$3,200,000	$3,100,000
Adj. P.	3,050,000	2,950,000	2,850,000

Time for construction: first ship, 730 days; second ship, 760 days; third ship, 910 days.

The general specifications for the ships are: length overall, 442 feet; beam, 62 feet; draft loaded, 25 feet; sustained sea speed, 17 knots; passenger capacity, 38; cargo capacity, 353,000 cubic feet, including 7,800 cubic feet of refrigerated space. The vessels are especially designed for the carriage of bauxite for the Aluminum Company of America, and will be operated from North Atlantic and Gulf Ports to the Caribbean.

Seattle-Tacoma Bid on P-4s

The Maritime Commission announced on September 10 the receipt of a bid from the Seattle-Tacoma Shipbuilding Corporation, Seattle, Wash., for construction of two transpacific luxury liners for operation from San Francisco to the Orient.

On a fixed price basis, the bid was $28,458,000 for each of two; and on an adjusted price basis, $23,715,000 for each of two. Time for construction of first ship, 1080 days; second ship, 1445 days.

General specifications of the ships are: length overall, 759 feet; beam on the water line, 98.2 feet; trial displacement, 35,500 tons; sustained sea speed, 24 knots; passenger carrying capacity, approximately 1000; ship's personnel, about 500; cargo space, approximately 535,000 bale cubic feet; offset smoke stacks making them quickly convertible into aircraft carriers in an emergency; propulsion twin screws driven through double-reduction gearing by triple-expansion turbines. These ships will be among the largest ever built in an American yard.

SHIPBUILDING CONTRACTS IN EXISTENCE FOR PRIVATE INTERESTS

VESSELS OVER 1,000 GROSS TONS EACH

EXCLUSIVE OF VESSELS FINANCED BY MARITIME COMMISSION PROGRAM

September 1st, 1940

Type	No.	Gross Tons	Steam		Turbo-Elec.		Diesel		Diesel Elec.	
			No.	H.P.	No.	H.P.	No.	H.P.	No.	H.P.
Cargo	7	52,180	5	40,000	—	—	2	3,400	—	—
Tanker	55	519,810	42	280,600	2	10,000	11	59,200	—	—
Ferry	2	5,470	1	3,840	—	—	—	—	1	950
Carferry	1	6,000	1	6,000	—	—	—	—	—	—

Cramp's Old Yard To Be Revived

A new firm was incorporated under the laws of the State of Pennsylvania on July 16, with the name "Shipyards Inc." This name has recently been changed to "Cramp Shipbuilding Company."

James Reed (well known on the Pacific Coast as constructor in charge at Mare Island Navy Yard during war days, and later as manager Los Angeles Shipbuilding and Dry Dock Company, manager of the Golden Gate Bridge, and director of the American President Lines) has resigned his connection with the A.P.L., and accepted the appointment as president of this revived Cramp Shipbuilding Company. **H. Birchard Taylor** is to be vice president; **Comm. R. D. Weyerbacher**, U.S.N. (Ret.), is to be vice president and general manager; and **Joseph P. Ripley**, chairman of the board.

The other directors are **E. Roland Harriman** and **Richard H. M. Robinson.**

For more than a century, Cramp was a very honorable name among American shipbuilders, and this revival will find a welcome response in the minds of all the oldtimers. The new firm is negotiating for naval contracts under the national defense appropriations.

MERCHANT VESSELS OVER 2,000 GROSS TONS EACH COMPLETED IN 1940 UP TO SEPTEMBER 1st, 1940

Type	No.	Gross Tons	Steam		Diesel		Turbo-Electric	
			No.	H.P.	No.	H.P.	No.	H.P.
Cargo	19	141,214	14	117,150	5	41,600	—	—
Tanker	9	86,351	8	69,200	—	—	1	6,030
Passenger	3	42,418	3	54,600	—	—	—	—
Totals	31	269,983	25	240,950	5	41,600	1	6,030

COMPLETED IN AUGUST AND INCLUDED IN ABOVE TOTALS FOR YEAR TO DATE

Name	Type	Gross Tons	Horsepower		Owner	Builder
			Steam	Diesel		
Delorleans	Pass.-Cargo	7,987	8,600	—	Mississippi Shipping Co.	Bethlehem Steel Co., Sp. Pt., Md.
Esso Nashville	Tanker	7,943	4,000	—	Standard Oil Co. of N. J.	Bethlehem Steel Co., Sp. Pt., Md.
Sea Witch	Cargo	6,021		6,000	Maritime Commission	Tampa S. B. & Engr. Co.
Exemplar	Cargo	6,736	8,800	—	Export Lines	Bethlehem Steel Co., Quincy, Mass
Totals	4	28,687	21,400	6,000		

LAUNCHINGS IN MONTH OF AUGUST VESSELS OVER 2,000 GROSS TONS EACH

Name	Date	Type	Gross Tons*	Horsepower		Owner	Builder
				Steam	Diesel		
Cape Alva	8-1	Cargo	6,400		4,000	Maritime Commission	Seattle-Tacoma S. B. Corp.
Joseph Lykes	8-3	Cargo	6,400	4,000		Maritime Commission	Federal S. B. & D. D. Co.
Exhibitor	8-3	Cargo	8,500	8,000		Maritime Commission	Bethlehem Steel Co., Quincy, Mass
Cape San Martin	8-6	Cargo	6,400	4,000	—	Maritime Commission	Bethlehem Steel Co., San Fr., Cal
Surprise	8-6	Cargo	7,400		6,000	Maritime Commission	Tampa S. B. & Engr. Co.
President Monroe	8-7	Pass.-Cargo	9,200	8,500	—	Maritime Commission	Newport News S. B. & D. D. Co.
American Manufacturer	8-8	Cargo	6,400		4,000	Maritime Commission	Western Pipe & Steel Co.
Exchester	8-17	Cargo	8,900	8,500	—	Maritime Commission	Ingalls S. B. Corp.
Mormacsun	8-28	Cargo	8,900	8,500	—	Maritime Commission	Moore Dry Dock Co.
Totals		9	68,500	41,500	14,000		

New Auxiliary Survey Vessel Bids

Admiral L. O. Colbert, director of the U. S. Coast and Geodetic Survey, announced on September 7 that the following bids were received for the construction of an 88-foot wooden, twin-screw, diesel-powered auxiliary

(Page 58, please)

Tables compiled by the American Bureau of Shipping.

National Defense and the Shipping Industry

*by G. H. Helmbold**

Director Operations & Traffic U. S. Maritime Commission

No basic industrial effort has been more disturbed and disorganized by present untoward conditions than transportation by sea. The commodities of today's ocean commerce are not those of yesterday, either in kind or in quantity. They do not move by the same routes nor from the same sources nor to the same destinations. Many of our ocean trade routes of necessity have been temporarily suspended, and many commodities that formerly moved in quantity no longer move at all. Many commodities are now being transported from sources formerly considered unavailable, for the need is now imperative, and distance and transportation expense are not now controlling factors. Today ocean movements of ships and commodities are probably controlled in greater measure by national necessity than by commercial requirements.

We are governed by new conditions, confronted with new problems, motivated by new and vital necessities. We are even accustoming ourselves to a new trade nomenclature. We now talk mostly in terms of strategic materials, namely, those materials essential to national defense, produced in whole or in part outside of Continental United States.

There are about 17 of these materials, and six are especially vital because of present or anticipated consumption and because of greater strategic necessity. They are chromium, manganese, rubber, tin, wool and manila fiber. Our national requirement of many of these strategic materials came from countries which are now blockaded or embraced in zones forbidden to our ships. New sources of supply when found may not be served by American tonnage or by sufficient tonnage of any flag. As a result, we have been compelled to reroute our vessels from trades now closed to them, to furnish them new employment, and at the same time provide for the movement of strategic materials from new-found sources and in tremendously increased quantities.

Rubber Imports

Public attention was first directed to this subject about a year ago this summer, when the United States entered into an agreement with Great Britain for the exchange of cotton for rubber of an equivalent total value. It was agreed that approximately half of the total quantity of each commodity should be carried by ships of our respective nations. The closing of the British Isles to our vessels by the Neutrality Act made a revision of that agreement necessary. As a result we are now transporting all the rubber, and Great Britain all the cotton. The revenue accruing to the two nations from these movements is practically the same. The advantages of such an arrangement are obvious when we consider that the United States is the world's largest consumer of rubber, all of which must be imported, whereas Great Britain is one of the world's largest consumers of cotton, and her importations from the United States will now be greatly increased. This exchange arrangement has necessitated the shifting of American flag tonnage to transpacific trade routes, since foreign flag vessels formerly carried approximately 70 per cent of our annual rubber requirements, and much of this foreign tonnage has been diverted under war conditions. At present, the greatest quantity of crude rubber is produced in British Malaya and the Dutch East Indies. Some quantities come from French Indo-China and Ceylon. Storage facilities must also be provided at American ports of discharge for a considerable portion of this rubber. With the large rubber manufacturing industry that has grown up in this nation in recent years, this movement undoubtedly will be noted at many domestic ports. The volume of this movement will not be inconsiderable. Our rubber imports in 1938 were 427,200 long tons, which is somewhat less than our normal importations.

Rubber importations for our industrial consumption have in the past been on a somewhat hand-to-mouth basis—that is, we seldom have had a reserve stock sufficient for more than three months. Because of unsettled world conditions, we must maintain larger stocks of rubber, as well as of other strategic materials, to protect us against any interruption in the source of our supply. This movement now taking place must cover not alone our normal consumption, but also the quantity our Government determines must be stored to give the nation an adequate reserve. This reserve will probably approximate a normal year's importation, and will be held, in part, at ports of discharge, and, in part, at interior points at or adjacent to the cities where manufactured.

Tin Movements

Tin is another strategic commodity which is being purchased and stored in quantities beyond our normal requirements of approximately 50,000 tons annually. This commodity also comes almost exclusively from the region of the Straits Settlements and from Bolivia, and its movement has

*Abstract of paper read before the 29th annual convention of the American Association of Port Authorities, Long Beach, Cal., Sept. 12.

had to be anticipated from a vessel tonnage standpoint.

Manganese Ore

However, by far the more radical change in the source and movement of any of these strategic commodities has arisen in connection with manganese ore. We consume an enormous quantity of this metal in our steel industry, approximately 650,000 long tons of which is imported annually. The largest manganese producing country is the Soviet Union—approximately one-half of the world's production coming from the Black Sea region. In past years a very considerable portion of our requirement was imported from that country. This source of supply has now been entirely eliminated for American flag vessels, and other adequate sources have had to be developed. We are now obtaining additional quantities of this commodity from the Philippine Islands, African Gold Coast, Brazil, India and Cuba, and we are also further developing production within the United States wherever practicable.

Before the present war began, over 65 per cent of our imports of manganese was carried in British bottoms. This tonnage being no longer available for this trade, the diversion of American tonnage has been required in order to insure the movement of an adequate supply for our industries. Neither chromium, wool, nor manila fiber has presented quite so much of a problem with respect to transportation from sources of supply as these other commodities mentioned. Chromium is produced chiefly in South Rhodesia and the Union of South Africa, as well as Soviet Russia and Turkey in Asia. Australia is the largest producer of wool, but the United States, Argentina and South Africa also are important sources of supply. Manila fiber comes almost entirely from the Philippine Islands. Without further change in world conditions, there should be no difficulty in securing adequate supplies of these commodities and ships for their transportation.

Sales of Shipping

In view of the present importance of the merchant marine, and our increased dependence upon United States flag vessels, some of you may have wondered about the transfer of many of them to foreign ownership and registry. It has been a subject of much discussion, critical and otherwise, in the public press. Such transactions are placed under the jurisdiction and within the discretion of the Maritime Commission by a provision in the Shipping Act of 1916, namely, Section 9 as amended. Congress did not intend that it should be exercised in a routine or perfunctory manner. Each application for transfer is handled on its individual merits after careful investigation of all the facts involved. In reaching a decision, a number of factors are taken into consideration. For example, the value of the particular vessel to our national defense, its value in connection with the development of an efficient American merchant marine, and especially its age; also the effect of the transfer upon the business welfare of the American owner, the availability of or plans for replacement tonnage, the proposed foreign employment of the vessel, and the effect of such transfer and future employment upon the general welfare of our people. All of these considerations are weighed carefully, and especial consideration given to the intent of Congress when it placed in the Commission's hands such wide discretionary authority to impose limitations upon the exercise of the citizens' ordinary property rights.

From last October through June 30, 1940, transfers to aliens have been approved for practically all types of vessels, but commercial cargo vessels of over 1000 gross tons have predominated in number. The average age of such vessels has been in excess of the twenty years normally considered as the economic life of a vessel. Many of those sold had actually been laid-up because they were unfit for further normal service. The sales prices of these commercial vessels, numbering approximately 132, has exceeded $40,000,000, and I am pleased to say that at least one-half of this amount has been pledged for the construction of new and modern ships for operation under the flag of the United States. This represents real progress in the development and rehabilitation of our merchant marine and the perpetuation of our American shipping industry.

In some instances, transfers have been made to the nationals of belligerent nations. The advantages of these transfers should be obvious. Agreements were secured in advance that the vessels so transferred would be utilized in trades between United States and foreign ports to which American vessels were barred by the Neutrality Act. Such transfers were instrumental in assuring American producers and shippers continued transportation facilities. In all such cases, however, special caution has been observed to insure that the vessels shall not be employed for belligerent purposes.

The trades from which some of the transferred vessels were drawn were the protected intercoastal and coastwise trades. Many operators in these trades have for a long time rendered very excellent service without a reasonable return on their investment, and others have sustained large losses. The fundamental cause for these conditions has been an excess of tonnage in these trades. Since the war began, these operators have been seriously handicapped. Their operating expenses have increased without commensurate increase in freight rates. The Commission has felt, therefore, that approval of the applications of certain of the owners for the sale of their vessels engaged in these trades would not only reduce surplus tonnage, but would enable such owners to improve their financial position through sales at war prices and ultimately permit the introduction of new replacement vessels. The Commission gave consideration to the fact that its authority over these trades is limited. It could not, under its statutory authority, require the maintenance of the existing services, nor prevent the withdrawal of the vessels for operation in foreign trades, or their sale to American citizens, their lay-up or scrapping. The removal of vessels from the coastwise trade has naturally produced some curtailment in service. For the particular localities affected, this is of course unfortunate, but our coastwise and intercoastal operators receive no Government aid in the form of subsidies, and they must observe, therefore, the law of supply and demand.

The Maritime Commission is charged with providing the nation with an adequate and well-balanced fleet. The Congress had in view cer-

tain definite purposes when it authorized the Commission to carry out this mandate. It sought to foster and protect our foreign trade, to develop our domestic trade and to furnish a naval and military auxiliary in time of war. It prescribed a method of accomplishing these ends, embracing studies of our shipping needs by definite trade routes, of the types of vessels that would best meet those needs, of structural elements to serve naval and military requirements. The steps taken by the Commission to carry out the instructions of Congress are well known. Fortunately, in view of subsequent world events, the Commission's construction program is considerably ahead of schedule.

Provisions of the shipping acts that now define the jurisdiction of the Maritime Commission and authorize its various activities mandate the Commission with certain regulatory jurisdiction over terminal properties, variously owned and operated. We have noted from the proceedings of the last two meetings of your Association that representatives of the Commission discussed at length the Commission's authority in this respect, the recommendations that have been made to the Congress, and the various measures that have been introduced affecting that authority by way of clarification, extension or diminution.

While the Commission's attorneys may not always agree with the views of your committee members, the exhaustive analysis and discussion of the various shipping measures embraced in their report to you can serve only a helpful purpose in mutual efforts to clarify the acts in question.

The Maritime Commission is directly responsible, and now operates, through lessees, terminals located at Boston, Philadelphia, Norfolk and Hoboken. These were transferred to the former United States Shipping Board from the War Department after the close of the World War. They are very extensive properties, representing a large investment of public funds, and serve more than half of the ocean tonnage calling at the ports where located, except that at Hoboken in Greater New York. The Commission also formerly controlled one-half of the terminal facilities of the Army Base at Brooklyn, but the Army has resumed operation of this terminal in order to meet its emergency needs for transport service. In the management of these properties, the Commission's interests run parallel with your own. However, we desire to advise you that the Commission imposes upon its terminal lessees the same rules of conduct as to rates, regulations and practices that it conceives Congress had in mind when it vested the Commission with general regulatory authority over terminals operated by its citizens. Rates must be maintained in harmony with those generally prevailing in the ports where the terminals are located, and discriminatory practices and unethical competition of every nature are specifically forbidden. These various matters are controlled by lease provisions.

Section 8 of the Shipping Act of 1920 lays down a broad foundation for mutual helpfulness between port and terminal institutions and the Federal Government. It provides for studies and reports by the War Department and the Maritime Commission upon all phases of the transfer of goods between ships and land transportation facilities, and especially of the means employed in such transfer.

There is one provision of this Section 8 referring to a matter whose more serious consideration might result in material mutual benefit. This clause reads as follows:

"* * * *to investigate the subject of water terminals, including the necessary docks, warehouses, apparatus, equipment, and appliances in connection therewith, with a view to devising and suggesting the types most appropriate for different locations and for the most expeditious and economical transfer or interchange of passengers or property between carriers by water and carriers by rail;* * * *"

It is an old maxim of the shipping business that the difference between a profit and a loss of a sea venture is represented in the time of the vessel in port. That maxim is probably more true today than when it was first written. The largest expense item in vessel operation today is that of cargo handling, embracing all the functions from the time it is received on the pier until it is stowed in the ship's hold, and vice versa. That expense rises and falls according to the efficiency of terminal operations, but that does not tell the entire story. The turnaround time of the ship is contingent upon that same efficiency, and, if a day or even a few hours can be saved in port, it substantially helps the credit side of the owner's ledger. That is the reason we should all be interested in the following words in the clause we have just quoted:

"* * apparatus, equipment and appliances in connection therewith *." We who operate ships are vitally interested, not alone in the construction of terminal properties designed for their most efficient operation, but in their equipment and in their appliances that increase the speed with which cargo can be handled in and out of ships, and which decrease the turn-around time of the vessel.

Some of the best engineering brains our country affords have been employed in designing and constructing piers and cargo sheds. We should assure ourselves that we have utilized equal ability in equipping and appliancing our terminals to produce the most efficient results. We suggest that the clause quoted above furnishes a basis for cooperative study along this line. When peace is restored, we anticipate the severest competition among maritime nations again seeking a place in the commercial sun. Consequently, we must be prepared to handle the transportation facilities for which we are mutually responsible as efficiently as is humanly possible. To this end the Maritime Commission is always ready to cooperate.

PACIFIC MARINE

Reviews

Capt. McDowell Heads Up Enterprise

At a recent meeting of the Board of Directors of the Enterprise Foundry Company and its Engine and Oil Burner Divisions, **Captain C. S. McDowell, U.S.N. Retired,** was appointed its new president and general manager. **Charles Hoehn,** for many years president of this 54-year-old San Francisco firm, was elevated at the same meeting to the board chairmanship.

In announcing the appointment of the new president and general manager, Mr. Hoehn said: "We feel that Captain McDowell's wide experience both as an engineer and as an executive will be a tremendous asset to the Enterprise organization. His appointment marks an important step forward in our program of expansion in both personnel and production facilities to meet the rapidly growing demands on western heavy industry." Captain McDowell was formerly Shipbuilding Consultant at the Consolidated Steel Company, Los Angeles, and previous to that time has held such positions as manager of the Pearl Harbor Navy Yard, Engineer Officer at Mare Island, and Supervising Engineer of Design of the 200 inch telescope and Director of Construction of the Palomar Mountain Observatory.

In commenting on recent and prospective business developments, Hoehn stated that activity in the various divisions of the Enterprise Foundry Company has shown a very steady and healthy growth during the past months and that prospects look very bright for the future, especially in the Engine Division which, due to the National Defense Program, has been most active in building Diesel engines. Further personnel additions are contemplated for the near future.

DONALD S. MACKAY

Donald Mackay Joins Texaco

The recent appointment of **Donald S. Mackay** as Marine Engineer of the Texas Company at San Francisco will prove interesting news to his many friends on the Coast and in Gulf ports.

Don assumes the duties of sales and service in the Bay districts formerly supervised by Fred Cordall. He takes over the marine responsibility with an excellent background of ship lubrication training by reason of his service in the engine rooms of many big liners.

During Shipping Board days, back in '19 to '21, he was associated with the J. H. W. Steel Company in New Orleans, at that time one of our largest shipping concerns. Later he joined up with the Mississippi Shipping Company as Chief Engineer of Delta Line ships.

His next connection was with Lykes Brothers Steamship Company with New Orleans again his home port. Signing up in 1927 with Swayne & Hoyt, Ltd., he began making his first trips to the Coast. During the years that followed he has been serving as chief engineer on just about every one of the Gulf Pacific liners until his appointment one month ago to the Texaco marine sales post here in San Francisco.

Don is back in his native California (he was born in Berkeley) after all these years of steaming . . . and is beginning to like it all over again. He lives in San Francisco. There's a Mrs. Mackay — AND a baby daughter.

He's too busy on his new job to indulge any of his hobbies right now and tells us he never enjoyed working so much before.

Fred Cordall Appointed Marine Super of Carpenter Line

Ferris J. ("Freddy") Cordall, saluted as "Limey" by just about every engineer entering the Port of San Francisco, departed these shores Australia-bound during the month of August . . . to take up the important post of Marine Superintendent of the Carpenter Overseas Shipping lines.

Fred Cordall has been the Texaco marine lubricating authority in the Bay area for twelve years, during which time he must have gone aboard hundreds of deep sea vessels calling at local ports . . . to say nothing of his intensive work with operators of small craft in San Francisco Bay waters.

He came to the Texas organization after many years of seagoing. From the days of his apprenticeship with Harland & Wolff at Southamton, he served in many an engine room—his first ticket aboard the White Star Liner Baltic, as junior. Followed years with the United States Line (then known as the American Line) with the United American Line . . . where he was senior second assistant engineer on the Reliance and thence to the Mount Carroll as Chief.

This latter vessel was purchased by Matson Navigation Company along with the Mount Clinton, and Cordall was detailed to bring the two liners to the West Coast. His next connection brought him to Swayne & Hoyt as chief of the Shipping Board ships the line was then operating. Before joining up with the Texas Company, he was with the Nelson Line, pioneer Coast ship operating firm.

Freddy has hosts of pals throughout the marine world . . . both Pacific and Atlantic Seaboards. Some of them will have the opportunity of splicing the main brace with him on putting in at Sydney down under.

He takes up his new duties with keen enthusiasm, we know . . . because we had a serious talk with him before he embarked on the T. S. Admiral Day. With the Carpenter Line, headed by Sir Walter R. Carpenter, he will oversee the engine records of eleven vessels running between Australia and Pacific American ports and in the local coastwise trade.

Here is our latest communication from him, written en route:

August 24, 1940.
En Route to Honolulu, T. H.,
TS "Admiral Day,"
Carpenter Line, Sydney, Australia.

Dear Bern and All the Gang:

Hello, everybody. Just a few lines to let you know that we have arrived on the second leg of our voyage and so far have had a fairly decent trip. Of course you can expect to have a few troubles after the big overhaul we had, but as these were looked for we were able to forestall any major troubles developing.

I sure want you to know that I appreciate the wonderful send-off I received. It was something to remember.

We had a rough trip with the light ship to Vancouver, but since she is loaded she is fairly good. We stop at Honolulu for fuel only, and then on to Sydney via Suva, that is, at least I hope so, as we have just received a message to be on the watch for two German raiders that are loose in the Pacific somewhere. We travel under entirely blackout at night and are under the orders of the British Route office who direct us on our courses.

I have sailed with a lot of men but this gang have got it all over anyone I have sailed with. They are so nonchalant about the risk, etc., you would think we are on a buggy ride. It is this spirit that Hitler can never break . . . the same spirit that prevails in all the British race. I noticed it while around Vancouver, B. C. We made four or five ports there, and the same spirit prevails, calm, cool, collected, defiant, determined to win out or go down at least giving them more than they can hand out.

Don't forget to give my best regards to all and tell them I said hello and cheerio.

F. J. CORDALL,
Marine Supt., W. R. Carpenter Line,
Sydney, Australia.

Bilge Club News of the Month

The members of the Bilge Club, Los Angeles Harbor's Shipping fraternity, gathered at the Marine Room of the Hilton Hotel in Long Beach on Friday evening, September 20, for a "Super Special" dinner and entertainment.

After loading "liquid stores," the members sat down to dinner served by the Hilton's staff. At the conclusion of dinner President Lloyd Moore welcomed the assembled members and then turned the evening over to the entertainment chairman, John Idom, who had provided an excellent bill of entertainment which was well received by those present.

After the entertainment the members who desired to do so engaged in a tournament of cribbage and dominoes.

Women's Traffic Club Has Birthday

The Women's Traffic Club of San Francisco is holding its birthday party at the Clift Hotel Saturday afternoon, September 28. **Sophie M. Gallagher**, of American President Lines, President of the Club, will preside. **Mabel Delucchi**, Entertainment Chairman, is in charge of the affair. After luncheon, cards and dancing will be enjoyed.

The Women's Traffic Club was formed August, 1925, and was the second of its kind in the United States. Fred A. Hooper, of American-Hawaiian Steamship Co., was founder of the clubs, and at the present every large city boasts of a similar organization.

The Women's Traffic Club of San Francisco is a member of the Associated Traffic Clubs of America.

Members are composed of women working in transportation companies or in traffic departments of industrial firms.

Sonya S. Marks is Publicity Chairman of the group.

News of the Propeller Clubs of the United States

Frank Foisie, president of the Waterfront Employers Association, presented startling facts before an absorbed audience at the September luncheon meeting of the Port of San Francisco held at the Palace Hotel on September 17th.

Speaking "within the family," Mr. Foisie brought a picture of the present-day Coast shipping situation which gave his listeners considerable food for thought. A rising ovation was tendered the guest speaker for the sincerity, keen insight and intelligence with which he acquainted us with the problems his organization and all allied Coastal groups are striving to solve.

The meeting was presided over by Frazer Bailey, who conducted the annual business at hand as a very capable last-minute substitute for President Tirey L. Ford.

Eugene Hoffman reported the club's financial record for the first year. Encouraging figures!

The annual election of new officers and directors resulted in a unanimous vote for the following:

Charles L. Wheeler
President

J. E. Cushing
First Vice-President

A. B. Poole
Second Vice-President

Hugh Gallagher
Third Vice-President

Eugene V. Hoffman
Secretary-Treasurer

One-Year Governors:

J. E. Cushing
Fred L. Doelker
A. S. Gunn
Roger Lapham
Ira Lillick

Two-Year Governors:

F. A. Bailey
E. H. Harms
Marshall Levis
A. B. Poole
Chas. L. Wheeler

Three-Year Governors:

Henry Blackstone
Hugh Gallagher
George Jordan
Capt. Lewis Mesherry
Jos. A. Moore, Sr.

Newly elected president Charles Wheeler took over the gavel and delivered well-chosen remarks about his ambitions for the club's welfare during his administration. In turn he introduced our speaker of the day, taking the occasion to compliment him and his associates for the tremendous work they are accomplishing.

R. E. Biggers, organizing President of the Propeller Club, Port of Chattanooga, accepting CHARTER for the Propeller Club, Port of Chattanooga (Port No. 74), from Arthur M. Tode, Honorary President of the Propeller Club of the United States, at Charter Meeting held on board the U.S.S. "Colbert" at Chattanooga on September 6, 1940.

Port of Tacoma

September 21, 1940

Mr. Bernard De Rochie
Pacific Marine Review
500 Sansome Street
San Francisco, California

Dear Mr. De Rochie:

Please note attached copy of the minutes of the first meeting for the new season of the Propeller Club, Port of Tacoma, which was held on Tuesday evening, September 17, at the Tacoma Club.

I sincerely hope this information will be of some interest to you in connection with your publication.

May I, at this time, extend my best wishes for the success of the Port of San Francisco in obtaining the 1941 Convention of the Propeller Club of the United States.

Most sincerely,
Charles C. Cramp.

The first fall meeting and dinner of the Propeller Club, Port of Tacoma, for the year 1940, was held at the Tacoma Club in the Washing-

(Continued on page 60)

National Defense and Shipbuilding

(Continued from page 27)

quantities being minimum estimates in round figures:

290 water tube boilers.
145 turbines.
145 reduction gear sets.
56 diesel engines (main propulsion).
80 diesel generating sets.
201 steam-turbo generating sets.
638 winches.
103 windlasses.
1800 pumps.
5000 electric motors.

In addition to these, there will be many miles of manila and wire rope, electric wiring, piping and tubing. Thousands of tons of mild steel in plates and shapes. Thousands of ventilating fans, lighting fixtures, electric lamps, wiring accessories, hundreds of ammunition hoists, furniture, decking, carpets and rugs, linoleum, tiling, plumbing fixtures, navigating instruments, bedding, paints, oils, galley equipment, tableware, and the thousand and one articles required for modern life at sea.

At its peak, this program will employ approximately 35,000 men on direct shipyard pay rolls, and will be indirectly responsible for the employment of at least as many more in outside plants, supply houses and general business.

On the Ways

(Continued from page 49)

surveying vessel which will be used in Alaskan waters:

Name of Bidder	Amount Bid	Time (days)
Astoria Marine Construction Company, Astoria, Oregon	$166,600	360
Lake Union Dry Dock & Machine Works, Seattle, Washington	164,150	280
S. E. Sagstad, Seattle, Washington	149,990	360
Seattle Shipbuilding & Drydock Corp., Seattle, Wash.	158,777	360
Tacoma Boat Building Company, Tacoma, Wash.	156,689	360
Ballard Marine Railway Company, Seattle, Wash.	199,837	360

Sales Force Shifts For Scovill

K. M. Reid, district sales manager for Scovill Manufacturing Company, covering Pacific Coast territory, with headquarters in San Francisco, reports the following changes in Scovill sales organization, effective September 1:

Herbert B. Schalk, who has been associated with the San Francisco office in sales of brass and copper mill products, has been transferred to the New York office, to continue on the same type of work in the New York metropolitan area under **George D. Engle**, sales manager for that district.

Herbert D. Udelmann has been transferred from the Los Angeles office to the San Francisco office, where he will work on sales of brass and copper mill products and manufactured goods to the marine, manufacturing and jobbing fields.

E. F. Steffan has been transferred from the San Francisco office to the Los Angeles office, to work on marine, manufacturing and jobbing sales of brass and copper products.

New 500-Ampere A-C Arc Welder

The General Electric Company has announced a new line of 500-ampere a-c arc welders offering advantages in performance and economy resulting from mechanical improvements and a new electrical design which incorporates power-factor correction.

This built-in feature makes possible a greatly-increased power-factor, which practically eliminates the useless lagging current drawn by conventional designs. Hence smaller primary cable, line switches and fuses can be used. This often results in a saving on installation costs, and makes possible the addition of more welders to existing feeders without causing overload. Any tendency toward an unbalanced load is reduced by one-third.

When operated below half load, this welder provides leading reactive kva for improvement of the shop power-factor; and when operated at no load, there is 19.5 kva available for this purpose.

Other advantages offered by this new G-E arc welder include fingertip adjustment by means of an easily-turned current-changing crank; a large, easily read current indicator extending up the side of the transformer case; protected output terminals accessible through holes in the insulating panel; and fan-forced ventilation, providing cool, dependable operation even at high currents or high-duty cycles. This refinement in design permits a reduction in size, weight and floor-space requirements. Hence the new welder is less than four feet in height, only 21 inches in diameter, and has a net weight of 600 pounds.

The only maintenance required is lubrication of the fan and current-adjuster every 12 to 18 months. The case, however, is easily removable so that inspection can be made, if desired.

Port of Tacoma -- cont.

ton Building, on Thursday evening, September 17.

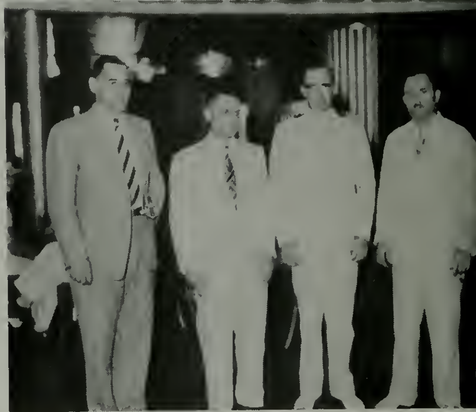
The meeting was called to order by President J. L. Moore, who extended a greeting to all of the members in attendance on the first "get-together" since last Spring.

The President gave a resume of correspondence received during the Summer months. One particular letter was given special consideration. This letter was received from the Secretary of the Propeller Club, Port of San Francisco, and had to do with their efforts to have the 1941 Convention of the Propeller Club of the United States held in their city.

The Port of San Francisco is asking for our cooperation in these efforts and it was moved and seconded by our members that we get behind them in every way possible.

The matter of our joining with the Transportation Club of Tacoma to celebrate the annual "Old Timers' Night" was discussed by the members. It was decided that we join with the Transportation Club as usual in this special meeting which will be held sometime in November.

The Propeller Club, Port of San Juan, welcomes the new S.S. "AMERICA" on the vessel's arrival at San Juan, Puerto Rico, on August 14, 1940.



(Reading left to right): Francis R. MacMahon, Past President, Propeller Club, Port of Havana; Jack Kentis, President, Propeller Club, Port of Havana; Captain Giles C. Stedman, Commanding the S.S. AMERICA; Arthur M. Tode, Honorary President, The Propeller Club of the United States; Hugo Hartenstein, Vice President, Propeller Club, Port of Havana.

Propeller Clubs Welcome S. S. America

The new S. S. America of the United States Lines sailed from New York on her maiden voyage to the West Indies on August 10th and the Propeller Clubs at San Juan, Port-au-Prince, Havana and Miami, took the lead in welcoming the new Queen of the Seas in their respective harbors.

The Propeller Club, Port of San Juan, arranged a monster reception for the vessel on her arrival August 14th.

A banner reading "Welcome America—Propeller Club, Port of San Juan," greeted the 800 passengers of the vessel when they came ashore. The officers and the Board of Governors of the Club gave a luncheon at the Hotel Condado in honor of Mr. Arthur M. Tode, honorary national president of the Propeller Club of the United States, and Mrs. Tode, who were making the maiden voyage on the S. S. America, and also Mr. A. J. McCarthy, vice president of the United States Lines; Captain Giles C. Stedman, master of the S. S. America; Mr. Vancortland Short, assistant to Mr. McCarthy; and Mr. Walter P. Jones, Publicity Director of the United States Lines.

While at Port-au-Prince, Haiti, on August 16th, the America was greeted by Mr. William E. Bleo, president, and Mr. Jack L. Berliant, secretary of the Propeller Club, Port-au-Prince.

Under the direction of Mr. Jack Kentis, president, and Mr. Francis R. MacMahon, past president, the Propeller Club, Port of Havana, welcomed the America on the morning of August 18th. The entire dock and its entrance had been decorated with greens and flowers by the Club and a large banner, "Welcome America—Propeller Club, Port of Havana," was prominently displayed. Through the efforts of the Club many offices of the waterfront and in the main shopping centers had their facades adorned and posters welcoming the America were distributed among establishments of Havana's principal streets.

At the invitation of the Propeller Club, Port of Miami, the United States arranged for the America to stop off a short while off-shore from Miami while en route to New York.

A flotilla of boats of every description enthusiastically welcomed the S. S. America, largest ship in America's merchant marine, off Miami Beach that morning.

Sleek pleasure craft, mingled with snub-nosed tugs, speed boats, charter fishing boats and even light 14-foot skiffs with outboard motors, during the hour and a half the America maneuvered between government cut and a point five miles up the coast.

Clipper Ship Red Jacket

(Continued from page 35)

"We hove to again at night. Next day, Saturday, was for the most part, a dead calm, and we were carried back with the current; not a breath of wind; the day most beautiful; clear sky and pleasant, only the air sharp. Icebergs were, however, still seen. Next day, Sunday, we passed a number more, which was the last ice seen."

Under the British Flag

On arrival at Liverpool the Red Jacket was purchased by Pilkington & Wilson for the White Star line; reported price, 30,000 pounds sterling. She continued as a regular packet in this line, in connection with the British or Colonial built clippers White Star, Shalimar and Mermaid for a number of years and was always a favorite with the traveling public. Captain Milward took the Red Jacket and had the satisfaction of beating the Lightning six days on the run out to Melbourne (75 against 81), September-November, 1855. The Red Jacket appears to have been a consistently fast passenger-maker, generally around the 80-day mark, although it is stated that her wings were clipped in the late 50's and she was finally put into other business. In 1865 we find her running to Calcutta, and she also made some trips to New Zealand. In 1868 she is listed as owned by Wilson & Chambers of Liverpool; shortly thereafter she was again sold, and went into the timber trade between Quebec and London, and was so engaged as late as 1882. Eventually she, in company with the old Black Baller, Donald Mackay, went to Cape Verde as a coal hulk, and as one author states: "How many of the Union-Castle passengers knew when they cast their eyes pityingly, or perhaps disdainfully, on the grimy looking hulk floating a cable's length or so away from their spotless liner; that they were looking upon a crack passenger ship of their grandfather's day?"

York Appoints Sales Executive

Anker Winther has been made assistant general sales manager of the York Ice Machinery Corporation, according to an announcement by *John R. Hertzler,* general sales manager.

Mr. Winther is a native of Brooklyn, N. Y., born there in 1905. He went to Stevens Institute of Technology, where he pledged Theta Xi and obtained his "B.S." in mechanical engineering in 1928. On leaving college he entered the York student course.

Since 1930 he has been connected with the York Cincinnati, Ohio, office as a sales engineer, and during this period has worked on important industrial refrigeration and air conditioning projects. He has sold and engineered a number of large-scale air conditioning installations, and has been associated with early dry ice development.

Building in American Yards

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco

NEW CONSTRUCTION:

Hulls Nos. 5360-5364, five C-1 cargo vessels for U. S. Maritime Commission, 395' x 60' x 37'6": 6400 gross tons each: 4000 H.P. Full scantling steam propulsion type. Keels laid, No. 5361, March 4, 1940: No. 5362, August 8, 1940. **Launching dates,** No. 5360, August 6, 1940; **No. 5361, October 4, 1940.**

Two destroyers for U. S. Navy.

DRYDOCK AND ROUTINE REPAIRS:

Tug H. T. Haviside, Haviside Barge No. 4. Huguenot, Torres, U.S.C.G.C. Daphne, Associated, Maya, Brimanger, Aztec, California Standard, Maliko. Conversion of destroyers Thornton, Gillis, Greene and Ballard into seaplane tenders.

COMMERCIAL IRON WORKS
412 Southeast Stephens St.
Portland, Ore.

NEW CONSTRUCTION:

One all-welded steel hog fuel barge 36' x 134'. **Completed September 30, 1940.**

One 45 tug. Completed September 30, 1940.

Four anti-submarine net tenders.

DRYDOCK AND ROUTINE REPAIRS:
Panama Express.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

NEW CONSTRUCTION:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. Keel laying dates June 3, June 17, December 9, 1940, and March 5, 1941; **launching dates, No. 156, October 31, 1940;** February 19, April 28 and July 24, 1941: delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

NEW CONSTRUCTION:

Gayle, 44-foot standardized sloop, "Island Clipper" class. Launched July 13, 1940.

Javelin, 44-foot standardized sloop, "Island Clipper" class. Launched August 6, 1940.

Ripple, 55-foot ketch-rig yacht. Launched August 29, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Aafje, Zoe H., Argyle, El Vida, El Perrito, Adventure, Privateer, Astrild, Saxon III; 40 smaller boats.

GENERAL ENGINEERING & DRY DOCK CO.
Foot of Schiller Street
Alameda, Calif.

DRYDOCK AND ROUTINE REPAIRS:

Noyo, Oil S. Galicia, Yacht Idalia, Olympic, Lumbertown, Gas S. Aurora, Ryder Hanify, Midway, Etolin, Dredge Pacific, Cutter Alert.

HARBOR BOAT BUILDING CO.
Berth 264, Fish Harbor
Terminal Island, Calif.

NEW CONSTRUCTION:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners; length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 H.P.; 10 knots speed; cost $160,000. **Delivery date October, 1940.**

LAKE UNION DRY DOCK & MACHINE WORKS
Fairview and Galer Streets
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS:
U. S. C. G. C. Rose, Kailua, Leviathan, Lightship No. 88.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

NEW CONSTRUCTION:
Order placed for construction of four anti-submarine net tenders.

LOS ANGELES SHIPBUILDING & DRY DOCK CORP.
Los Angeles Harbor
San Pedro, Calif.

DRYDOCK AND ROUTINE REPAIRS.
Yachts Mariner and Contender, La Purisima, W. H. Berg, West Coast, Iselin, Fish Boat Superior, General Petroleum Barge No. 3, Anchor Barge Olympia, Eidanger, Dagmar Salen, Lahaina.

MARE ISLAND NAVY YARD
Mare Island, Calif.

NEW CONSTRUCTION:

Tuna, submarine (SS203); keel laid July 19, 1939.

Gudgeon, submarine (SS211); keel laid November 22, 1939.

Fulton, submarine tender (AS11); keel laid July 19, 1939.

YO44 and YO45, two fuel barges; YO44 launched September 17, 1940.

YSD14, seaplane wrecking derrick; keel laid July 17, 1940.

Sperry, submarine tender (AS12); order placed June 12, 1940.

Silversides (SS236), Trigger (SS237), Wahoo (SS238) and Whale (SS239); four submarines: order placed June 28, 1940.

SS281 and SS282, two submarines; order placed September 9, 1940.

DRYDOCK AND ROUTINE REPAIRS:

Phoenix, Houston, Palmer, Hogan, McFarland, Farragut, Dale, Monaghan, Aylwin, Howard, Stansbury, McDougal, Davis, Jouett, Ramapo, Platte, Vireo, Montgomery, Chewink, Vega, Sturgeon, Sargo.

THE MOORE DRY DOCK CO.
Oakland, Calif.

NEW CONSTRUCTION:

Hull No. 196, Mormacsea, cargo vessel for U. S. Maritime Commission; LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6", SHP normal 8500, SHP max. 9350, dis. 17,600 tons, deadweight 11,926 tons; steam turbine propelled. Launched December 22, 1939; **approximate delivery date October 20, 1940.**

Hulls Nos. 197, Mormacstar; and 198, Mormacsun, two C-3 vessels for U. S. Maritime Commission LOA 492' 0", LBP 465', breadth molded 69' 6", depth molded 42' 6". Launching dates, No. 197, June 11, 1940; No. 198, August 28, 1940. Approximate delivery date, No. 197, January 17, 1941.

Hull No. 199, caisson gate for Drydock No. 2, Pearl Harbor, Bureau of Yards and Docks. 150' long, 22' beam, 57' high. Keel laid August 12, 1940.

DRYDOCK AND ROUTINE REPAIRS:

W. S. Miller, J. C. Fitzsimmons, Jacob Luckenbach, Zaca, Pomona, Klipfontein, President Polk, Pennsylvanian, Gracie S., Flying Cloud, Texan, Wilhelmina, Komoku, Yacht Barbara Jean, Kim, J. A. Moffett, Quinault, Pacific Ranger, Jalapa, H. T. Harper, Dagmar Salen, Saliwati, Etolin, Tangier, Mexican, Lumbertown.

PACIFIC DRY DOCK & REPAIR CO.
Foot of 14th Ave.
Oakland, Calif.

NEW CONSTRUCTION:

One all-welded steel oil barge 148' x 38' x 9'; 300,000 gal. capacity.

THE PUGET SOUND NAVY YARD
Bremerton, Washington

NEW CONSTRUCTION:

Charles F. Hughes (Destroyer No. 428); standard displacement 1600 tons. Launched May 16, 1940; **commissioned September 5, 1940.**

Monssen (Destroyer No. DD436). Launched May 16, 1940.

Ala (YT139). Launched November 6, 1939.

Barnegat (AVP10), seaplane tender; keel laid October 27, 1939.

Biscayne (AVP11), seaplane tender; keel laid October 27, 1939.

Casco (AVP12), seaplane tender; keel laid May 30, 1940.

Mackinac (AVP13), seaplane tender; keel laid May 30, 1940.

Seaplane wrecking derrick (YSD15); keel laid September 10, 1940.

Ships authorized: Halford (DD480), Leutze (DD481), DD592-DD597, eight destroyers; YSD18, (YSD24-YSD26), four seaplane wrecking derricks.

SEATTLE-TACOMA SHIPBUILDING CORP.
Foot of Alexander Ave.,
Tacoma, Wash.

NEW CONSTRUCTION:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw; full scantling diesel propulsion type. Two General-M.A.N. 2,100-H.P. diesels; 14 knots speed. **Keel laying dates,** March 5, April 15, August 12, **October 5, 1940,** and February 10, 1941. **Launching dates,** August 1, **September 28,** November 30, 1940; February 1 and May 1, 1941. Delivery dates, January 1, February 1, June 1, July 1 and October 1, 1941.

TODD SEATTLE DRY DOCKS, INC.
Harbor Island
Seattle, Wash.

DRYDOCK AND ROUTINE REPAIRS

Quillayute, William Luckenbach, Grenanger, U. S. A. T. Liberty, U. S. S. Harris, Northwestern, Koei Maru, U. S. S. Zeilin, Brandanger, Liloa, Paul Luckenbach, Coast Trader, Coldbrook, West Portal.

WESTERN BOAT BUILDING CO., INC.
2505 East 11th Street
Tacoma, Wash.

NEW CONSTRUCTION:

Hull No. 143, Western Queen, purse seine fishing boat for Spiro Babich, Gig Harbor, Wash.; 95' x 25'; 400-H.P. Atlas engine. Launching date, June 1, 1940; **delivered September 1, 1940.**

Hull No. 144, purse seine fishing boat, 95' x 24', for stock. Keel laid September 10, 1940.

Hull No. 145, fishing boat, 115' x 26'. Keel laid October 1, 1940.

DRYDOCK AND ROUTINE REPAIRS:
Fishing boats Sitka, Robert B., Gladiator.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

NEW CONSTRUCTION:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-H.P. engines. Keel laying dates, February 5, February 19, August 15, November 10, 1940; and March 1, 1941. **Launching dates,** August 8, **October 8,** November 10, **1940;** March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

NEW CONSTRUCTION:

Four sand barges 148' x 36' x 15' 6" for Panama Canal.

Ten coal barges 175' x 26' x 11' for stock.

Fifteen freight barges, 280' x 48' x 11' for Inland Waterways Corp., St. Louis, Mo.

THE AMERICAN SHIPBUILDING CO.
Cleveland, Ohio

NEW CONSTRUCTION:

Twelve net tenders for U. S. Navy.

DRYDOCK AND ROUTINE REPAIRS:
CHICAGO PLANT: D. W. Cook. CLEVELAND PLANT: Dredge Mogul. LORAIN PLANT: G. A. Boeckling, John Halst.

BATH IRON WORKS
Bath, Maine

NEW CONSTRUCTION:

Hulls Nos. 180-181, DD429, Livermore, and DD430, Eberle, two 1620 ton destroyers for U. S. Navy. **Delivery dates October** and **December, 1940.**

Hulls Nos. 182-183, DD437, Woolsey, and DD438, Ludlow, two 1620-ton destroyers for U. S. Navy. Delivery dates May and July, 1941.

Hulls Nos. 184-187, four cargo ships for American Export Line; 400' x 60' x 39'. Delivery dates September, October, 1941; April and June, 1942.

Hulls Nos. 188-189, DD457 and DD458, two destroyers for U. S. Navy. Delivery dates December, 1941, and February, 1942.

Hulls Nos. 190-195, DD449-451, 467-469, six destroyers for U. S. Navy.

Hulls Nos. 196-206, DD507-DD517, eleven destroyers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

NEW CONSTRUCTION:

Hulls Nos. 1470, Benson, and 1471, Mayo, two 1,600-ton destroyers for U. S. Navy. Launched November 15, 1939, and March 26, 1940.

Hull No. 1478, Massachusetts; 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego, and 1480, San Juan, two 6,000-ton cruisers for U. S Navy. Keels laid March 27 and May 15, 1940.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission; 450' B.P. x 66' x 42' 3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons. No. 1481 launched June 22, 1940.

Hulls Nos. 1485-1487, three tankers 502' x 68' x 37'; 21,000 tons.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co.; 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co.; 15,450 tons dwt.

Hulls Nos. 1494-1497, four heavy cruisers for U. S. Navy.

Hulls Nos. 1498-1501, four light cruisers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

NEW CONSTRUCTION:

Hull No. 4331, Esso Albany; 16,300 dwt. ton tanker for Standard Oil Co. of N. J.; 18 knots speed. Launching date April 27, 1940

Hull No. 4339, Deltargentino, passenger and cargo ship for Mississippi Shipping Co. Launching date, July 13, 1940; delivery date, December 1, 1940.

Hulls Nos. 4341-4343, three cargo vessels for Seas Shipping Co.; LOA 485', LBP 450', beam 66', draft 43'.

Hulls Nos. 4344, James Lykes, 4345-4348, five C-1 cargo vessels. LOA 417 , LBP 395', beam, 60', depth 37' 6". No. 4344 launched July 27, 1940.

Hulls Nos. 4350-4352, three cargo vessels for Seas Shipping Co.; 450' x 66' x 34'; 6300 H.P.; 8500 gross tons.

Hulls Nos. 4353-4356, four oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9,800 gross tons.

Hull No. 4357, oil tanker for Union Oil Co. of Calif.; 442' x 63' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4358-4359, two oil tankers for Socony Vacuum Oil Co.; 487'6" x 68' x 37'; 12,000 H.P.; 9800 gross tons.

Hulls Nos. 4360-4361, two oil tankers for Union Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4362-4364, three cargo and passenger vessels for Mississippi Shipping Co.; 465' x 65'6" x 39'9"; 8600 H.P.; 8300 gross tons.

Hull No. 4365, oil tanker for Richfield Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

Hulls Nos. 4367-4368, two oil tankers for Panama Transport Co.; 487'6" x 68' x 37'; 7000 H.P.; 9800 gross tons.

Hull No. 4369, oil tanker for Continental Oil Co.; 442' x 64' x 34'10"; 3500 H.P.; 8000 gross tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

NEW CONSTRUCTION:

Hulls Nos. 8015-8019, five cargo vessels, C-1-B design, for U. S. Maritime Commission. Length O.A. 417' 9", breadth 60' 0", depth 37' 5". **Launching dates October 3** and December 1, **1940;** and April 1, July 1 and September 1, 1941, respectively. Delivery dates April 1, June 1, August 1, November 1, 1941; and January 1, 1942, respectively. All above dates tentative.

Hulls Nos. 8021-8022, two destroyers for U. S. Navy.

Hulls Nos. 8023-8032, ten destroyers for U. S. Navy.

U. S. NAVY YARD
Boston, Mass.

NEW CONSTRUCTION:

DD425, Madison, 1600-ton destroyer. Launched October 20, 1939; **completion date September 2, 1940.**

DD426, Lansdale, 1600-ton destroyer. Launched October 20, 1939; completion date November 1, 1940.

DD433, Gwin, 1600-ton destroyer. Launched May 25, 1940; completion date March 1, 1941.

DD434, Meredith, 1600-ton destroyer. Launched April 24, 1940; completion date May 1, 1941.

DD441, Wilkes, 1600-ton destroyer. Launched May 31, 1940; completion date July 1, 1941.

DD442, Nicholson, 1600-ton destroyer. Launched May 31, 1940; completion date September 1, 1941.

DD461, 1600-ton destroyer. Completion date February 12, 1942.

DD462, 1600-ton destroyer. Completion date April 12, 1942.

DD472, 1600-ton destroyer. Completion date March 1, 1943.

DD473, 1600-ton destroyer. Completion date May 1, 1943.

DD474, 1600-ton destroyer. Completion date July 1, 1943.

DD475, 1600-ton destroyer. Completion date September 1, 1943.

DD476, 1600-ton destroyer. Completion date January 1, 1943.

AVP21, Humboldt, seaplane tender. Completion date October 12, 1941.

AVP22, Matagorda, seaplane tender. Completion date December 12, 1941.

YF258, covered lighter. Launched August 9, 1940;**completion date September 1, 1940.**

YSD11, seaplane wrecking derrick. Launched July 22, 1940; completion date November 15, 1940.

YSD20, seaplane wrecking derrick. Completion date May 1, 1941.

YSD22, seaplane wrecking derrick. Completion date January 1, 1941.

YSD23, seaplane wrecking derrick. Completion date March 1, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

NEW CONSTRUCTION:

BB 55, North Carolina, battleship; L.B.P 714′ 0″, beam to outside armor 108′ 0″. std. displ. 35,000 tons; geared turbine engines; express type boilers. Launched June 13, 1940; contract delivery, September 1, 1941; estimated delivery date, October 15, 1941.

BB 61, Iowa, battleship; LOA 880′, beam 108′; 4500 tons standard displacement; geared turbines. Keel laid June 27, 1940. Contract delivery date August 1, 1943.

BB 63, Missouri, battleship; LOA 880′, beam 108′, 4500 tons standard displacement; geared turbines. Order placed June 12, 1940.

IRA S. BUSHEY & SONS, INC.
Foot of Court Street
Brooklyn, N. Y.

NEW CONSTRUCTION:

Steel tug 90 x 23 x 10; Fairbanks Morse 805 H.P. engine; for U. S. Navy. **Delivery date September, 1940.**

Two 82′ diesel tugs each powered with 575-hp F-M engine.

One 90′ diesel tug; 805-hp F-M engine.

Two 77′ diesel tugs; 450-hp F-M engines.

One 100′ diesel tug; 805-hp F-M engine.

Two wooden deck scows for Tri-boro Scow Co.; 118′ x 36′ x 10′.

One wooden dry dock section for Bethlehem Shipbuilidng Co., Brooklyn.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

NEW CONSTRUCTION:

Hull No. 167, Sub-chaser, PC-452, length 174′, for U. S. Navy. Keel laid March 14, 1940.

Hulls Nos. 168-170 (YT145-YT148), three 100′ harbor tugs for U. S. Navy.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1659, one welded steel oil barge 148′ x 38′ x 9′ for Pacific Dry Dock & Repair Co., San Francisco, Calif.; 426 gross tons.

Hull No. 1678, one caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hull No. 1689, one 760-H.P. twin screw diesel towboat 135′ x 27′ x 11′ 9″ for Keystone Sand Division, Dravo Corp.; 290 gross tons.

Hulls Nos. 1695-1701, seven welded steel car floats 250′ x 34′ x 9′ 1″ for Pennsylvania R.R.; 4158 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 943 gross tons.

Hull No. 1712, one 760-H.P. twin screw diesel towboat hull 135′ x 27′ x 11′ 9″ for Semet Solvay Company; 290 gross tons.

Hulls Nos. 1729-1735, seven type W-7 welded bulk cargo barges 175′ x 26′ x 10′ 8″ for stock; 3304 gross tons.

Hull No. 1736, one welded steel oil fuel storage barge for Brooklyn Edison Co.; 375 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges 175′ x 26′ x 10′ 8″ for stock; 4720 gross tons.

Hull No. 1750, one 1300-hp twin screw diesel towboat 176′ x 36′ x 10′ for stock; 590 gross tons.

Hull No. 1751, 760 H.P. twin screw diesel towboat 145′ x 26′ x 8′ for stock; 318 gross tons.

Hulls Nos. 1752-1756, five welded steel gasoline barges 195′ x 35′ x 9′9″ for stock; 2990 gross tons.

Hulls Nos. 1757-1759, three welded coal barges 134′ x 34′ x 17′ for M. & J. Tracy, Inc., New York City; 2301 gross tons.

Hulls Nos. 1760-1767, eight welded sand and gravel barges, deck type, 130′ x 34′ x 10′, for Warner Co., Philadelphia, Pa.; 3616 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

NEW CONSTRUCTION:

Hull No. 37, Thresher (SS200); standard displacement 1475 tons; launched March 27, 1940; **delivered August 27, 1940.**

Hull No. 39 Gar (SS206); standard displacement 1475 tons; keel laid December 27, 1939.

Hull No. 40 Grampus (SS207); standard displacement 1475 tons; keel laid February 14, 1940.

Hull No. 41 Grayback (SS208); standard displacement 1475 tons; keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204); standard displacement 800 tons; keel laid October 6, 1939.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

NEW CONSTRUCTION:

Hull No. 161, Kearny, torpedo boat destroyer for the United States Navy. Launched March 9, 1940; **delivered September 12, 1940.**

Hulls Nos. 166, Howell Lykes; and 167; two C-3 cargo vessels for U. S. Maritime Commission. No. 166 launched July 13, 1940; **delivered September 9, 1940.**

Hulls Nos. 168-169, CL51, Atlanta, and CL52, Juneau, two 6000 ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison, and 171, Ericsson, two torpedo boat destroyers for the United States Navy. Keels laid March 18, 1940.

Hulls Nos. 172, Joseph Lykes; 173-176, five C-1 cargo vessels for U. S. Maritime Commission. Keels laid, Nos. 174-175, June 6, 1940; No. 176, August 12, 1940; **Launching date,** No. 172, August 3, 1940; **No. 173, October 5, 1940.**

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two C-3 cargo ships for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co.; 13,000 dwt. tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co.; 15,000 dwt.

Hulls Nos. 194-197, four destroyers for U. S. Navy.

Hulls Nos. 198-203, six destroyers for U. S. Navy.

Hulls Nos. 204-205, two destroyers for U. S. Navy.

GULFPORT BOILER & WELDING WORKS, INC.
P. O. Box 1179
Port Arthur, Texas

NEW CONSTRUCTION:

Hull No. 153, tugboat for General Motors Corp. 100′ x 24′ x 12′ 4″; 1000 shp G.M. diesel and auxiliary.

Hull No. 157, tugboat. 70′ x 18′ x 10′ 3″; 400 hp Atlas diesel and auxiliary.

Drill barge for W. T. Burton Co., Sulphur, La. 118′ x 44′ x 16′ hull with superstructure.

THE INGALLS SHIPBUILDING CORP.
Yards: Pascagoula, Miss.; and Decatur, Ala.

NEW CONSTRUCTION:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 265 to 268, four C-3 IN passenger and cargo vessels for U. S. Lines. De-

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livery dates March 15, April 15, June 15 and August 1, 1941.

Hull No. 274, river towboat for Socony-Vacuum Oil Co., N. Y., N. Y. 147' x 35' x 7' 6". **Estimated completion date, September 1, 1940.**

One oil tanker for Husky Transit Corp., Minneapolis, Minn.; 235' x 35' x 14'. Estimated completion date January 3, 1941.

One derrick barge for Dunbar & Sullivan Dredging Co., Detroit, Mich.; 100' x 43' x 10'. Estimated completion date November 1, 1940.

Three steam turbine vessels for American-South African Lines; 492' long, 69' 6" beam; 9500 shp; 18,000 tons dis.; 19 knots speed.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

NEW CONSTRUCTION:

One steel twin screw carferry, 406' x 57' x 23.5'. Approximate dates, **launching date, September 18, 1940;** delivery date, January 4, 1941.

One steel twin screw diesel towboat, 140' x 35' x 8' 6". Delivery date, November, 1940.

THE MARYLAND DRYDOCK CO.
Baltimore, Md.

DRYDOCK AND ROUTINE REPAIRS:

Tender Beech, Deer Lodge, West Celeron.

JOHN H. MATHIS CO.
Camden, N. J.

NEW CONSTRUCTION:

Four anti-submarine net tenders for U. S. Navy.

One bulk carrier tanker 265' long for Thos. Bowes, N. A.

DRYDOCK AND ROUTINE REPAIRS:

U. S. N. Tug.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

NEW CONSTRUCTION:

Hull No. 372, Esso Columbia, oil tanker for Standard Oil Company of New Jersey; gross tonnage about 11,500 tons; L.B.P. 525', breadth molded 75', depth molded 39 '. Keel laid February 5, 1940; **launched September 18, 1940.**

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379, 380, 381, 382, 383 and 384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6", gross tonnage about 9100 tons. Keels laid, No. 381, December 26, 1939; No. 382, February 5, 1940; No. 383, June 10, 1940; No. 384, August 12, 1940. **Launching dates,** No. 379, June 7, 1940; No. 380, August 7, 1940; **No. 381, October 4, 1940.**

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single screw combination passenger and cargo vessel for U. S. Maritime Commission; length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. Length 465', breadth 69' 6", depth 42' 6"; gross tonnage about 7,700. Keel laid, No. 387, August 12, 1940. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. Length 435', breadth 63', depth 40' 6"; gross tonnage about 8,000. Delivery date August 1, 1941.

Hulls Nos. 390-391, (CL62-CL63), two light cruisers for U. S. Navy.

Hulls Nos. 392-394 (CV9-CV11), three aircraft carriers for U. S. Navy.

Hulls Nos. 395-398 (CV12-CV15), four aircraft carriers for U. S. Navy.

Hulls Nos. 399-400 (CL80-CL81), two light cruisers for U. S. Navy.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

NEW CONSTRUCTION:

AV4, Curtiss, seaplane tender for U. S. Navy; launched April 20, 1940.

AV5, Albemarle, seaplane tender for U. S. Navy; keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland, and CL56, Columbia, two cruisers for U. S. Navy; order placed March 23, 1940.

CL57 and CL58, two cruisers for U. S. Navy. Order placed June 12, 1940.

AV7, Currituck, seaplane tender for U. S. Navy.

CL59-CL61, three cruisers for U. S. Navy.

U. S. NAVY YARD
Portsmouth, N. H.

NEW CONSTRUCTION:

Submarines SS201, Triton; SS202, Trout; SS209, Grayling, SS210, Grenadier; SS205, Marlin; SS228, SS229, SS230, SS231, SS232, SS233, SS234, SS235.

THE PUSEY & JONES CORP.
Wilmington, Del.

NEW CONSTRUCTION:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp.; 1600 gross tons; 300' x 65' x 20'; steam Una-Flow propulsion; 3600 H.P.; 16-knots speed; cost $1,000,000. **Launching date September 16, 1940;** delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 5000 gross tons; 413' x 60' x 37' 6"; turbine propulsion; 4000 H.P.; 14-knots speed; cost $1,928,000. Launching date November 1, 1940; delivery dates January and March, 1941, respectively.

Hull No. 1079, tug for Long Island R.R. Co.; 105' x 24' x 12' 11"; 210 gross tons; Una-Flow steam machinery; 800 S.H.P.; 11 knots speed. **Launching date October 15, 1940;** delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co.; 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 S.H.P.; 15 m.p.h. speed. Launching date December, 1940; delivery date 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

NEW CONSTRUCTION:

Hulls Nos. 186-189, four C-3 single screw combination passenger and cargo vessels 465' x 69' 6" x 42' 6"; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 193. one tanker for Standard Oil Co. of Calif.; 375' x 57' x 29'; 7,000 dwt. tons. Delivery date March, 1941.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J.; 18,000 dwt. Delivery dates March and June, 1941.

Hull No. 196, one tanker for Sun Oil Co.; 18,000 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co.; 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission; 7,500 tons. Delivery dates June, August, October, December, 1941; January, March, May, July, 1942.

Hull No. 207, diesel tanker for Panama Transport Co.; 18,000 dwt. Delivery date August, 1941.

Hulls Nos. 208-210, three tankers for Petroleum Shipping Co.; 16,400 dwt.; steam turbine. Delivery dates October, December, 1941; February, 1942.

Hull No. 211, tanker for Atlantic Refining Co.; 19,400 tons. Delivery date August, 1941.

Hull No. 212, tanker for Sun Oil Co.; 18,000 tons. Delivery date June, 1941.

Hulls Nos. 213-215, three tankers for Panama Transport Co.; 18,000 tons; steam turbine. Delivery dates June, November, 1943; September, 1942.

Hulls Nos. 216-220, five diesel tankers for Panama Transport Co.; 18,000 dwt. Delivery dates March, June, September, 1943; April, September, 1944.

Hulls Nos. 221-222, two tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine. Delivery dates June and July, 1942.

Hulls Nos. 223-225, three 16-knot tankers for The Texas Co.; single screw steam turbine; 13,285 tons dwt. Delivery dates August, September, October, 1942.

Hulls Nos. 226-228, three tankers for Keystone Tankship Corp.; 16,400 tons; steam turbine. Delivery dates November, 1942; January, February, 1943.

Hull No. 229, tanker for Atlantic Refining Co.; 19,400 tons.

TAMPA SHIPBUILDING & ENGINEERING CO.
P. O. Box 1838
Tampa, Fla.

NEW CONSTRUCTION:

Hulls Nos. 34-36, three C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons; diesel powered.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission; 459' x 63' x 31' 6"; 9291 dwt. tons.

PACIFIC MARINE REVIEW

American President Lines' Speedy New Round the World Liner S S President Jackson

Official Organ

Pacific American Steamship Association

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Shipowners Association of the Pacific Coast

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PACIFIC MARINE REVIEW

Contents - November, 1940

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J. S. Hines, *President and Publisher* — B. N. DeRochie, *Assistant Publisher* — Paul Faulkner, *Advertising Manager* — Alexander J. Dickie, *Editor* — F. Dryden Moore, *Assistant Editor*

PACIFIC MARINE REVIEW

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1940

Pacific Coast Shipbuilding

The backlog of orders for naval and mercantile vessels to be built in Pacific Coast shipyards is now well over $750,000,000. Nearly $600,000,000 of this is due to National Defense measures, and is for naval use and under naval supervision.

This huge program means that during the next five years the shipbuilding centers of the Pacific Coast will be dispensing wages of approximately $350,000,000 above their normal pay roll of the past two years. It means also large increase in employment in general business and in the industries catering to the needs of shipbuilding.

While this is an emergency boom, it is superimposed on large natural demands for replacement tonnage. This natural demand must yield priority to National Defense measures, but in the meantime the need for replacement is being intensified as the satisfaction thereof is being deferred. This intensification process is now getting quite a boost from the Navy through the buying up of new and old merchant tonnage for naval auxiliary purposes. Every ship so purchased means reconditioning and alteration work for shipyards, and means probably the building of more new commercial tonnage at the end of the National Defense emergency building.

In other words, all signs point to a long period of prosperity for American shipyards and the industries that produce the machinery, equipment and materials for ships.

The Secretary of the Navy, recognizing the need for speed in the National Defense program, has authorized the allocation of some $96,000,000 of Federal funds in the expansion of existing shipyard plant. Of this total, some $20,000,000 is said to be allocated to Pacific Coast shipyards.

Three new shipyards are definitely under way. These are: the new Seattle-Tacoma Shipbuilding Corporation destroyer-building plant on Harbor Island, Seattle, alongside the Todd-Seattle Dry Docks, which will cost approximately $5,000,000; the new plant of the San Francisco Yard of the Union Plant of the Bethlehem Steel Company Shipbuilding Division, which for site, structures and equipment will cost $10,130,000; and the new plant of the Southern California Shipbuilding Company on Terminal Island, Long Beach, cost of which has not been announced.

In addition to the above new yards, there are: being revived at a cost of $2,756,000 the San Pedro Works, Bethlehem Steel Company Shipbuilding Division, which has an order for six destroyers; and the yard of the Los Angeles Shipbuilding and Dry Dock Company.

The active shipyard capacity of the Pacific Coast is being more than doubled in the expansion projects now under way.

American Ships Are Safe Ships

Maritime Commission chairman Emory S. Land, Rear Admiral, U. S. N. (Ret.), recently sent the following message to the Marine Section of the National Safety Council Convention, which met in Chicago on Monday, October 7:

"I am very pleased to greet the members of the Marine Section of the National Safety Council in convention, and to congratulate them upon the excellence of their program and upon the marked improvements in safety aboard ship which have been made during the past few years as a result of their activities.

"Increasing safety on shipboard has been, ever since the founding of the Maritime Commission, one of the primary aims of my colleagues and myself. I think it can safely be said that as a result of the work of our technical experts in ship design and equipment, Commission-designed vessels are today the safest in the world.

"That this increase in the safety factor of America's merchant marine has been achieved at insignificant increases in the costs of construction and operation of our ships is a tribute to the efficiency and the truly American ingeniousness of our shipbuilders and operators, as well as to the scientific standards of our designers.

Pacific Coast Shipping and

Some Notes on the Doings of Ship Operators and of Maritime Organizations

San Francisco Marine Exchange Committees

The Marine Exchange of the San Francisco Chamber of Commerce is, through strong committees, keeping careful watch over legislation and regulations affecting Pacific Coast shipping. These committees carry on their duties with quiet efficiency, and occasionally make reports of progress. During the past month two interesting bulletins have been issued by the Exchange, each of which deals with the recent work of one of these committees.

First we hear from the "Dangerous Commodities Committee," a group whose duty is a very serious one under the present international situation.

Dangerous Commodities Committee

This committee is composed of:

Bert D. Robertson (chairman), Standard Oil Co. of California.
C. E. Dole, General Petroleum Corp.
W. B. Gribble, W. P. Fuller Co.
F. M. Jacobs, Union Oil Co.
J. W. Jory, Marine Board of Underwriters.
W. M. Minor, Joint Conference Committee.
Roy S. Norton, Shell Oil Co.
C. A. Reali, General Steamship Corp.
G. J. Schlenkel, J. A. McNear Co.
A. E. Stow, American Hawaiian S. S. Co.
J. R. Wagner, American President Lines.
G. F. Williams, Grace Line.
A. L. Wise, Kerr S. S. Co., Inc.

This representative group is at present interested in House Resolution 7357, the "Dangerous Cargo Act," which, after many alterations by Congress, following its introduction, was signed by the President on October 9, 1940.

It is an enabling act, giving the Bureau of Marine Inspection and Navigation of the Department of Commerce authority to enforce certain provisions contained in the Act, as well as detailed regulations to be prepared by the Bureau.

The Act itself will go into effect on April 9, 1941. The initial detailed regulations, in accordance with the Act, shall be promulgated within ninety days of the signing of the Act; that is, within ninety days of October 9, 1940.

The Dangerous Cargo Committee of the Marine Exchange has asked the Bureau of Marine Inspection and Navigation to send it copies of the proposed regulations as soon as they are available. The committee will make a thorough study of these regulations on their receipt from the Bureau, and report its findings to members of the Exchange.

The Customs Committee

The other committee is that charged with the study of customs legislation, rules and regulations. This committee includes:

R. C. Robinson, Chairman, Harper-Robinson Co.
Ray Demora, Interocean S. S. Corp.
Capt. E. N. W. Hunter, Matson Navigation Co.
D. Lindstedt, Balfour-Guthrie & Co.
E. J. Judge, Grace Line.
M. J. McCarthy, Stanton & Berry.
W. M. Minor, Pacific Foreign Trade S. S. Association.
Bert D. Robertson, Standard Oil Co. of California.
R. S. Van Duyne, Thornley & Pitt.
Capt. L. H. Westdahl, American President Lines.
John P. Williams, Pacific American Shipowners Association.

This committee is new. It fulfills a very important function in the maritime life of the port. From the text of the bulletin, we gather that the committee is quietly assuming full responsibility for its function, and is getting results. The text of the bulletin follows:

Twenty-four-Hour Customs Service

The committee first met in June of this year upon receipt of a notice from the Collector of Customs that the long-established twenty-four-hour service for the boarding of incoming vessels by customs officers was to be discontinued.

The committee decided to protest the change, and called on the collector to collaborate with it in arriving at a method by which the service could be continued. Through the cooperation of the collector and his staff, the notice was rescinded. The service is not only being maintained as theretofore, but has been improved.

Immigration Retains Downtown Office

Recently the members of the Marine Exchange learned that the Immigration and Naturalization Service planned to move its entire force, including officers temporarily quartered in the Customs House, to the former Salvation Army Training College Building at 801 Silver Avenue, in the southern part of the city. The committee convened to discuss the resulting inconvenience that would follow the move, and subsequently met with the District Director of the Immigration and Naturalization Service to review the matter. The Director assures us that he will retain an office in Room 107 of the Customs House for the purpose of handling all types of inquiries, as well as the handling of applications for reentry permits, seamen's identification certificates, extensions of stay, the receiving of reports required to be filed by steamship companies, including changes in crew and passenger lists and the supplying of forms.

The committee decided that in view of the retention of an office in the Customs House, it would not protest the temporary location of the staff of the Service at Silver Avenue, where it will remain for about two years. Thereafter the Service will be

Port Activities

located in the new appraisers building on Sansome Street, where the old building is now being demolished.

Other Committee Activities

(1) The committee has now undertaken the securing of continuous twenty-four-hour service, instead of from sunrise to sunset, from the Bureau of Entomology and Plant Quarantine.

(2) Removal of the offices of the Shipping Commissioner from the present inconvenient site in the old Mint Building to the Customs House.

(3) The locating of the Public Health Service's Quarantine Station on the San Francisco waterfront, instead of, as at present, on Angel Island, from which point occasional delays are caused incoming vessels, particularly in foggy weather.

American Mail Line Expansion

Establishment of an American-flag ship service from Columbia River ports in Oregon to the Orient was approved by the United States Maritime Commission on October 2.

The new service will be operated by the American Mail Line, now running from Puget Sound ports to the Orient. Regular American-flag service from the Portland, Oregon, region has not been available since 1937.

Commission approval was given to a $20,000,000 program for nine new ships for the expanded Pacific Northwest-Orient run of the American Mail Line. Six Commission-designed C-2 type, 15½-knot freighters and three Commission-designed C-1 type, 14-knot freighters will be placed in service.

The first of the new vessels is scheduled for delivery to the line in January, 1941, and is expected to be the Cape Alva, C-1 freighter, recently launched by the Seattle-Tacoma Shipbuilding Corp. under the sponsorship of Mrs. John Boettiger of Seattle. The Cape Alva is the first ocean-going merchant vessel to be built in the Pacific Northwest since the World War period.

All of the nine new ships will be in service by 1942, replacing the six older vessels now being used.

The program provides for a minimum of 32 sailings a year, 12 of which will be from Columbia River ports and 20 from Puget Sound ports. Request has been made to the Commission for the privilege of returning by way of California ports, with restricted types of cargo, on monthly sailings.

Of the C-2 ships scheduled for the line, three are now building at the Federal Shipbuilding and Dry Dock Company, Kearny, New Jersey, and three at the Sun Shipbuilding and Dry Dock Company, Chester, Pennsylvania. Of the C-1 vessels, two are building at Seattle-Tacoma and one at Bethlehem Steel Company, San Francisco, California.

The formal agreement with the American Mail Line will be executed in the near future.

Ocean Dominion Becomes Alcoa

The Ocean Dominion Steamship Corporation, a subsidiary of the Aluminum Company of America, whose New York service is rendered under the name American Caribbean Line, will henceforth be called the Alcoa Steamship Company. Harmon Lewis, president of the line, announced this change in San Francisco, where Government and line officials assembled for the launching on Friday, October 4, of the first of a new fleet of seven ships for the United States Maritime Commission and the company. This first ship was christened Alcoa Pioneer by Miss Nancy Lewis, daughter of the president of the line.

Completion of the seven ships, at a cost of $17,000,000, will raise the total of the company's ships flying the American flag to 21, with a total deadweight tonnage of 162,962, thus bringing the major portion of the "Aluminum Line" tonnage into the United States Merchant Marine. Four of the new ships are being built at the Union Plant of the Bethlehem Steel Company, Shipbuilding Division, and will be completed within the next ten months. The other three are being built by the Moore Dry Dock Company, Oakland, California.

The new ships will be pressed into service, as soon as they are ready, to help implement the country's program of building friendly trade with countries of South America and the West Indies. The ships, in addition to bringing in the principal raw materials for airplanes, bauxite from South America, may well figure in national defense plans in another way, since included in the ocean points along their regular routes will be all of the island naval bases for which the United States received rights from England recently in the deal involving 50 over-age destroyers. Ships of the Line will be well fitted to handle supplies for the Army and Navy going out to America's defense bases in Bermuda, Jamaica, Antigua, St. Lucia, Trinidad and the Guianas.

These new ships will result in speedier, more efficient service. The Alcoa Pioneer and the next three to follow it are to be of the C-1, steam-propelled, full scantling type designed by the United States Maritime Commission to carry a cargo capacity of 8,047 tons and eight passengers. The last three will be a modification of the C-2 cargo and passenger type, and will carry 38 passengers in addition to cargo.

Use of the name Ocean Dominion, and also American Caribbean Line, the latter now used for the company's New York service, would probably be dropped shortly in favor of the newly-selected name Alcoa. The popular designation—"Aluminum Line"—will probably remain, since the ships are painted with aluminum paint and look as though they were made of the metal itself.

George Sutherland, general manager, Los [An]geles Shipbuilding and Dry Dock Company

Southern California

One Hundred and Ten Million and Merchant Ships ordered the Los Angeles Harbor

As we go to press, word comes that a National Defense contract to build six seaplane tenders, at an approximate price of $6,000,000 each, has been allotted to the Southern California Shipbuilding Corporation. This brings the total U. S. Maritime Commission and U. S. Navy commitments for shipbuilding in the Los Angeles-Long Beach harbor area to over $110,000,000.

Included in this program are:

San Pedro Works, Bethlehem Steel Company, Shipbuilding Division	
6 destroyers	$48,600,000
For yard improvements	2,756,000
Los Angeles Shipbuilding and Dry Dock Company	
1 Navy fleet repair ship	16,000,000
For yard improvements	450,000
Consolidated Steel Corporation	
4 C-1 cargo steamers	7,560,000
Southern California Shipbuilding Corporation	
6 seaplane tenders	36,000,000
Total shipbuilding and shipyard building	$111,367,000

This huge program of shipbuilding will employ thousands of men, and will pay out at least $55,000,000 for salary and wage accounts in Southern California during the next four years.

In addition, one Southern California firm, the Consolidated Steel Corporation, has been awarded an allocation of twelve destroyers, to be built at their Orange, Texas, yard. This yard will be completely rebuilt for the purpose by a Los Angeles contracting firm.

In separate articles in this issue, we treat the Los Angeles and Long Beach plants of the Consolidated Steel Corporation and the San Pedro plant of the Los Angeles Shipbuilding and Dry Dock Company. Both of these firms are working in shipyards that required more or less simple overhaul and alteration.

The San Pedro Works of Bethlehem has for sixteen or seventeen years confined its efforts exclusively to ship repair, and the shipbuilding part of the plant has to be recreated *de novo.*

The Southern California Shipbuilding Corporation is a new firm, and is building a new shipyard.

Southern California Shipbuilding Corporation

This firm holds a 90-acre shipyard site at the east end of Terminal Island and facing the west side of the Long Beach inner harbor entrance channel. Here a shipyard has been laid out, and a large crew is working to lay the foundations for shipbuilding ways and shipyard shops so that the firm will be ready in a few weeks to start construction on its first ship.

The site is ideal in many ways. There is a long deep-water frontage, with ample width of deep and comparatively clear water for launching. The foundation is good at comparatively shallow depth.

Large financial and contracting interests of Los Angeles are said to be backing this corporation, and it is claimed that their plans for the shipyard are somewhat ahead of any existing Pacific Coast ship-construction plant in convenience of arrangement, efficiency of material handling and scope of welding assembly facilities.

The Navy shipbuilding allocations to Southern California are all under the direction of the Naval Supervisor of Shipbuilding for the district, Captain H. S. Jeans. On all of the shipyard improvement projects for which the U. S. Navy is making a grant of cash, there is also complete supervision, both of the actual work and of publicity thereon.

Bethlehem San Pedro Works

The San Pedro Works of the Union Plant of the Shipbuilding Division of the Bethlehem Steel Company occupies a strategic position on the east side and near the outer entrance to the main channel of Los Angeles Inner Harbor. This plant, established as the Southwestern Shipbuilding Company early in 1918, has a long and honorable record as a builder, repairer and reconditioner of ships. Twenty-two large seagoing steel cargo ships, with an aggregate gross measurement of over 130,000 tons, were built and engined here during the first four years of the life of this yard.

In 1922 the plant was absorbed by the Bethlehem Shipbuilding Corporation and made over into an efficient repair and reconditioning yard. Fitted with an excellent sectional floating drydock, and having ample outfitting wharves and facilities for heavy lifts, it has enjoyed a large share of the ship repair and overhaul work at Los Angeles harbor. This repair work has enabled the yard to maintain a technical organization and a very considerable skilled personnel.

The September, 1940, National Defense work allocations brought to the San Pedro Works of the Shipbuilding Division of Bethlehem Steel Company an award of six torpedo boat destroyers at a total price said to be over $48,000,000. The plans for construction of the six ships call for the installation of two building ways and two

Shipbuilding Program

Dollars Worth of Naval from the Yards of District

Alden G. Roach, vice president in charge of shipbuilding, Consolidated Steel Corporation

finger wharves for outfitting docks. In connection with these ways and docks, cranes and other equipment for handling materials will be installed.

A rearrangement and modernization of the entire plant is now in process. This includes:

The realignment of all industrial railway trackage within the plant.

The overhauling of existing electric wiring, hydraulic piping and pneumatic piping.

The installation of new wiring and piping, with adequate outlets for welding and riveting power on welding racks and ways.

Installation of large welding racks.

Purchase and installation of machinery, welding equipment and riveting equipment for complete fabrication of the hulls.

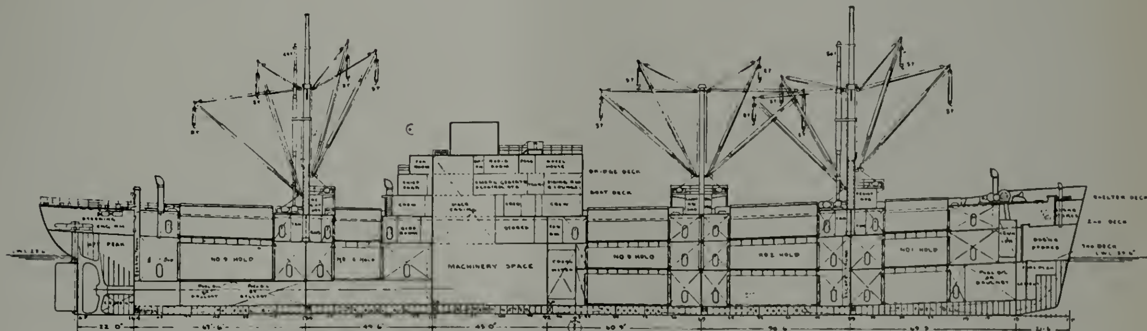
Rebuilding of administrative offices to adapt them for U. S. Navy inspection and supervision officials.

Provision of additional locker and sanitary accommodation for workmen.

It is estimated that over $1,500,000 will be expended on this work, and that when the shipbuilding program is in full swing, the employed force will approximate 2000 men for four years.

The Bethlehem yard at San Pedro has the advantage of being able to draw on Bethlehem's large technical staff for advice and support. It is part of the large Union plant, which has always maintained a very capable staff of naval architects and marine engineers, and for sixty years has been among the leading steel shipbuilding plants in America.

The two shipbuilding ways to be built at the San Pedro Works will be permanent ways with steel trestle-supported crane runways. They will have ample space on both sides and on the inshore ends for welded assemblies, and they will be of sufficient size to take Maritime Commission cargo ships.



Inboard profile of C-1 full-scantling type cargo steamer. Four of these are under construction at the plant of the Consolidated Steel Corporation

Los Angeles Shipbuilding & Dry Dock Co.

Plate storage yard and crane. Machine shop is on the left, mold loft and plate shop on the right

Prepares for Large Ship Construction Program

With a contract from the U. S. Navy on its books, and with final and hearty Supreme Court approval of its reorganization plans, the Los Angeles Shipbuilding and Dry Dock Company is now fast getting its yard into splendid condition to forge ahead on construction.

Located at San Pedro on the south side of the West Basin of Los Angeles' inner harbor, this plant comprises some 57 acres of what was formerly known as Smith's Island. Here, on May 21, 1917, the then newly-organized firm started to develop a shipyard. The plans called for a six-way yard with adequate shops and facilities to take care of all fabrication and erection of hull steel, and the machining, erection and installation of propulsion and auxiliary machinery.

During the decade from 1917 to 1927 this Los Angeles yard was a very busy shipbuilding plant. In that time 40 steel vessels were built, with an aggregate gross measure of well over 240,000 tons. During that decade also, two large passenger liners were given a complete new interior, and large numbers of vessels of all classes were repaired, reconditioned and/or painted.

A large sectional floating dock capable of lifting 12,000 tons was installed in the early days of the plant, and has been fairly busy during the whole of its history.

During the twenty-three years of its history, the work at this plant has contributed to Pacific Coast labor and industry over $100,000,000 for wages, purchase of materials, purchase equipment and payment of taxes and interest. Of the total amount, over $45,000,000 went to yard pay rolls.

Most of the shops and facilities are still in place. The work now under way, therefore, is the reconditioning and realignment of existing plant, and the purchase and installation of new equipment to adapt this shipyard for the modern technique in shipbuilding.

The newly-organized firm has a group of progressive business and civic leaders as a Board of Directors to govern its policies. W. W. Powell heads the company as chairman of the Board. Other directors are Robert L. McCourt, Charles H. Quinn, Harold English, Maynard McFie, William Simpson and George Larwill. Of these men, four are or have been directors of the Los Angeles Chamber of Commerce. McCourt, McFie and Simpson are past presidents of that body, and English is at present a member of its Board of Directors.

The executives of the firm are: W. W. Powell, president; George R. Larwill, vice president; J. B. Ingoldsby, secretary-treasurer; and George Sutherland, general manager.

While 15 years have passed since a ship of any considerable size has been built in this yard, the Los Angeles Shipbuilding and Dry Dock Company has during those years been fairly busy on large ship repair work, and has constantly maintained a skeleton organization of competent shipyard executives. These men, headed by George Sutherland, the capable general manager, are now planning and supervising the operation of remodeling this yard into a modern, efficient shipbuilding plant.

The mold loft and plate shop were revamped first. The floor of the loft, which is the ceiling of the plate shop below, was raised and leveled and a new floor laid on top of the old floor. This floor is 380 feet long by 65 feet wide, and provides ample well-lighted space for laying out full-scale templets of all hull steel shapes and plates. The roof girders over the floor are fitted with racks for templet storage.

The machinery in the plate shop has been overhauled and rearranged. A large Jones and Hillis gate shear has been added, and the 26-foot plate bending rolls have been lengthened to 32 feet. Furnaces and bending slabs at the end of the plate shop are in good condition and will be used as is. The furnaces are gas-fired. An ample equipment of hydraulic bulldozers serves the bending slab.

Two new overhead bridge cranes will

The mold loft at Los Angeles Shipbuilding and Dry Dock Co. yard is 385 feet long by 65 feet wide

The machine shop is over 500 feet long, and is equipped with ample cranes and with machine tools adequate for all shipyard work

The large rolls in the plate shop are 32 feet long

The bending slab and furnace equipment for shaping frames, beams and other parts of the ship structure is a very important equipment unit in the shipyard. The Los Angeles Shipbuilding and Dry Dock Co. bending slab and furnaces, shown here, are adequate for their work

be installed to serve the plate shop for its entire length. For serving the various plate and shape fabricating machines, an efficient layout of roller tables has been designed, and is being built in the yard. A large plate and shape storage yard lies between the fabrication shop and the machine shop, and is served for its full length by a large electric gantry crane with overhung ends, which can swing material into either shop. Ample industrial trackage serves this yard and the shops on either side.

The machine shop in this yard is more than adequate to take care of all demands that may be made upon it. The building is over 500 feet long, and is constructed with a central bay 60 feet wide and having for the majority of its length two side bays each 42 feet wide. All of the large special machine tools (such as engine lathes for turning line and tail shafts, and large planers and boring mills) are being completely reconditioned. Two 25-ton overhead cranes serve the entire length of the central bay. From 1917 to 1924 this machine shop built the triple expansion steam engines and most of the auxiliary machinery for the ships built in the yard.

In the pneumatic power house, the compressor plant is in very good condition, having been in constant use. The wooden house covering these compressors is to be dismantled and replaced with a steel structure.

The fabrication shop lies across the inshore end of the ways, with ample room between for welding assemblies. In this space the industrial tracks have been taken up and will be relaid in a position to allow the maximum of open, unobstructed area for welding racks.

At present only the No. 1 way will be rebuilt. This is to be a permanent structure with steel erections supporting runways for overhead bridge cranes. These runways will be 600 feet long with 91 feet gage, which will class this way among the largest on the Pacific Coast. Two 25-ton Shaw-Box bridge cranes will be mounted on these runways. Together, these cranes will be of ample capacity to handle any welded assembly or heavy casting or forging going into any ship that can be built on this way.

Plans for future development at present contemplate a total of four building ways. The waterfront on which these ways are built faces the main channel of the West Basin of Los Angeles' inner harbor with a straight run of at least a half mile in unobstructed deep water.

For handling the installation of heavy machinery on ships, the outfitting dock is being equipped with a large Whirley crane mounted on a portable base spanning the dockside railway tracks. This crane is being built by the Colby Steel and Engineering Co. of Seattle, and will have a 25-ton capacity at 50-foot radius to height of 85 feet above the dock. Light- and heavy-weight hooks will enable this crane to handle all loads up to capacity with efficiency and dispatch.

All the industrial trackage in the yard is being overhauled and replaced to expedite material handling. All electric light and power wiring, all pneumatic and hydraulic piping, is being reconditioned, and considerable new heavy wiring is being installed to take care of welding machines.

Welding machines will be purchased as required to bring the equipment up to modern standards. Flame-cutting will be extensively used. Both hydraulic and pneumatic riveting will be in use, and ample provision will be made in both types of riveters, and for power with which to operate the same.

The ship which Los Angeles Shipbuilding and Dry Dock Company has contracted to build for the U. S. Navy is a fleet repair vessel, a sister ship to the Vulcan, now under construction at New York Shipbuilding Company, Camden, New Jersey.

According to Navy records, these vessels are 530 feet in length by 71 feet beam, and will be equipped with all the latest tools and devices to qualify them as floating shops capable of effecting all ordinary repairs to machinery and equipment on naval vessels at sea.

The Southern California

Consolidated Steel Corporation Fabricates C-1 Hulls at an and Erects them in a Water-side Shipyard Filled with

The Consolidated Steel Corporation was first among Southern California firms to obtain a shipbuilding contract from the U. S. Maritime Commission. This firm has at Maywood, California, one of the finest steel fabrication plants on the Pacific Coast, and has long enjoyed an excellent reputation for reliability and prompt dispatch in the fabrication and erection of almost every variety of large steel structural work.

When they entered a bid for four C-1 type U. S. Maritime Commission cargo steamers, the proposed program of construction was to fabricate and weld large assemblies of the hull structure at Maywood and ship them to Long Beach harbor for erection on the ways at a part of the Craig Shipbuilding Yard, which had been leased for this purpose.

Unfortunately, almost from the start of actual work the shipyard end of this plan became involved in a jurisdictional dispute between rival union labor factions, and almost continuously the yard has been picketed. Under these conditions, railroad shipment between the fabrication plant and the yard had to be abandoned, and the assembly welding at the Maywood plant confined in weight and size to the limits imposed by the capacities of available trucks and highways.

Considering these handicaps, the work has progressed very well, and Consolidated Steel is now ready to launch its first hull, the S.S. Cape Mendocino, on the morning of November 14.

At the Maywood plant the work of fabrication is done in much the same way

Aerial perspective of the Long Beach yard of Consolidated Steel Corporation, showing arrangement of ways, buildings and fabricating park. Note oil well derricks. This picture was taken on October 3

Shipyard That Is Different

Inland Steel Plant, Producing Oil Wells

as in a shipyard. A "mold loft" was constructed, which is not a loft, since it is on the ground level in its separate building. This, incidentally, is the first mold loft we have seen so built. The floor is 270 feet by 70 feet and is covered by a steel building whose sides are largely glazed sash, giving an abundance of light. Here templets are developed full size for all shapes and plates going into the hull. From these templets the structural material is fabricated, carefully marked for location in the hull and stored ready for welding assembly and/or delivery to the shipyard.

Modern methods and machines of all types are available for fabrication. A large plate edge-planer served by automatic roller tables insures exact fit of plate butt joints. Automatic flame-cutting machines are used for economical cutting of lightening holes in floors and structural steel bases for machinery. Ample batteries of punches and drills prepare the material for riveted joints. There is generous provision of all types of welding facilities, including oxy-acetylene, carbon arc and automatic Unionmelt-process machines.

At the shipyard, some 18 miles from the fabricating plant, the organization includes an inspector's office that carefully inspects each piece of fabricated material and each welded assembly to determine if it is ready for erection in the hull. This office also cooperates with the fabricating plant so that proper priority in fabrication and shipment is given to those pieces and assemblies for which erection at the shipyard is imminent.

When the material has been inspected and checked by the inspectors' office, it is stored on racks adjacent to the welding assembly and fabrication yard. This yard is adjacent to the shipbuilding way. Two large cranes are available for servicing the fabrication yard and the shipbuilding

Aerial close-up of the Consolidated Steel Corporation shipyard at Long Beach, showing one and a half C-1 hulls on the building ways. Picture taken on October 3

way. One of these is a bridge gantry spanning the building way. This gantry is supported by a steel leg on each side, each leg running on a ground rail covering the entire length of the way. The bridge overhangs on the inshore end so that its trolley can pick up material spotted along the inshore side of the way. The other crane is a Whirley type mounted on a steel portal type tower and spanning the industrial trackage through the length of the fabrication yard. These cranes, singly or in combination, easily handle any weights required in the erection of the hulls.

The shipbuilding way in this yard is arranged for sidewise launching, and is a continuous concrete sea wall along a channel having 35 feet of water. The Consolidated Steel Corporation has approximately 800 feet of this building way, which enables them to erect simultaneously a complete C-1 hull and a little over one-half of another. Thus there are now on the way the entire hull of an unnamed C-1, which will be ready to launch on November 14, and the stern half of another C-1 hull, which will be rushed to completion immediately on the launching of the first hull. Also, as soon as the first hull is out of the way, the keel will be laid for the stern half of No. 3 hull, and the process repeated until the four hulls are finished.

Two aerial views of the main deck of the first C-1 built by the Consolidated Steel Corporation, Long Beach, California. These pictures were taken on September 25, 1940. This hull is to be launched on November 14

Working under considerable handicap, Consolidated has made excellent progress, and in fabricated storage has a very considerable part of the hulls of the next two vessels ready for erection

The C-1 cargo vessels which Consolidated Steel Corporation is building are at present allocated to the New York and Cuba Mail Steamship Company. This is the third allocation since construction of these hulls began, and each change of allocation has brought with it changes in arrangement and details.

Of the C-1 full scantling, steam turbine drive type, these ships have the characteristics indicated in the table herewith:

Length overall	416′ 0″
Length B.P.	395′ 0″
Beam molded	60′ 0″
Depth molded S. D.	37′ 6″
Draft loaded	27′ 6″
Height 2nd to S. decks	9′ 6″
Height 3d to 2nd decks	10′ 6″
Sea speed, loaded	14 knots
Normal shp	4,000
Normal crew	43
Passenger capacity	8
Gross measurement	6,750 tons
Net measurement	4,800 tons
Weight hull steel	2,365 tons
Outfit	767 tons
Engineering	500 tons
Margin	168 tons
Total Built Weight	3,800 tons
Fuel oil	889 tons
Crew and Stores	35 tons
Fresh water	336 tons
Cargo deadweight	7,815 tons
Loaded displacement	12,875 tons
Bale cargo capacity	450,146 cu. ft.

The hulls of these C-1s are riveted on the longitudinal joints of the shell plating. The ends of shell plating are butt welded, and practically all interior hull structure joints are welded.

The ships will be propelled by a single screw driven through double speed reduction Westinghouse gears by a Westinghouse cross-compound turbine taking steam at 450 pounds pressure and 750° F. temperature from two Babcock & Wilcox marine type water tube boilers. This combination normally transmits 4,000 shp to the propeller shaft at 90 rpm speed on that shaft. On tests, the turbine and the boilers must show capacity for continuous operation at 10 per cent above normal rating, and for 25 per cent above normal rating for two hours.

Westinghouse Electric and Manufacturing Company are supplying: the condensers, the electric motors for the deck machinery and for part of the engine room auxiliaries, the steam turbine generating sets, the switchboard, and the control systems for electric power.

American Hoist and Derrick Company are supplying the anchor windlass, the warping capstans and the cargo winches.

The steering mechanism will be a Lidgerwood electro-hydraulic gear with the usual provision for manual and automatic control from the pilot house and the bridge.

Before the launching date, the boilers will be erected and the turbines and gears mounted in the ship practically complete. The boilers in the one half-ship left on the ways are over 90 per cent erected.

Many welded assemblies of the tank tops and floors of the bow end of the ship number two are waiting ready to be lifted and spotted in place as soon as Hull No. 1 is off the ways.

The Consolidated Steel Corporation has become so much interested in shipbuilding that they recently purchased a shipyard in Orange, Texas, and have negotiated with the United States Navy a contract to build there twelve torpedo boat destroyers at a total cost said to be $97,200,000.

Columbia Steel Company is responsible for the steel castings and large forgings, and for anchors. The anchor cables are the famous Naco cast steel stud link chain, made by the National Malleable and Steel Castings Co.

The boilers are fitted with: Diamond soot blowers, Buffalo Forge Company force draft blowers, Bailey combustion control, Leslie steam pressure reducing valves, and Wager CO_2 indicators.

Built into the turbine casing, a Kingsbury thrust bearing takes the force of the screw propeller. Pure lubricating oil will be insured by a Sharples centrifuge. The line and propeller shafts were forged by Bethlehem, and the propeller shaft bronze sleeve was cast by Sandusky Foundry and Machine Co. The engine room telegraph and the intercommunication system is by Bendix. Most of the pumps are by Worthington, driven by General Electric motors.

Refrigeration machinery is being supplied by the York Ice Machinery Co., and insulation both for living quarters and for the stores and cargo refrigerated spaces will be by the Cork Insulation Company.

Fans for the ventilation system are supplied by the B. F. Sturtevant Co., air ports by the Torrey Roller Bushing Works, and windows by the Kearfott Engineering Co.

The fire extinguishing system is by the C-O-Two Fire Equipment Co. All the furniture will be of incombustible material, and will be supplied by the General Fireproofing Co. All joiner work is of metal fashioned by the Martin-Parry Corporation. The linen and bedding will be furnished by Jas. McCutcheon and Co. All galley equipment and tableware will be supplied by the Dohrmann Hotel Supply Co.

Navigating and safety equipment includes: Compasses and electric sounding machine by the A. Lietz Co.; radio and radio direction finder by the Radiomarine Corporation of America; master gyro compass repeaters, gyro pilot and course recorder by Sperry Gyroscope Co.; emergency diesel generating set by Buda; Fathometer echo sounding machine by the Submarine Signal Co.; life-saving equipment by the Sculler Safety Corporation; and lifeboats and davits by Welin.

Manila rope will be supplied by Whitlock Cordage Co., and wire rope by the Bethlehem Steel Company.

Towboat St. Paul Socony on her trial run

River's Finest—

All-Welded, Steel-Hull, Twin-Screw, Diesel-Drive Towboat St. Paul Socony

by John Wood
Naval Architect, Ingalls Shipbuilding Corporation

On August 10, gaily bedecked with flags and bunting, and with the traditional champagne glistening on her bow, the towboat St. Paul Socony slid down the ways at the Decatur, Alabama, shipyards of the Ingalls Shipbuilding Corp.

Built in the heart of the Tennessee Valley Authority district, this modern, powerful vessel has achieved the unique distinction of being the most powerful boat ever constructed on the Tennessee River.

Sponsored by Mrs. Ray Ruben Irwin, the launching was high lighted by a short address by David E. Lillienthal, director of the Tennessee Valley Authority, in which he lauded the cooperative spirit of both Government and private enterprise in making this achievement possible. Mr. Lillienthal expressed the thoughts of many when he said, "Navigation on the Tennessee River has become a reality, and a century of effort to make the Tennessee a navigable stream has at last come to fruition."

The citizens of Decatur and the Wheeler Dam district were all aware of the importance of this occasion, and turned out in large numbers to witness the colorful event. Also included among the guests were many of the country's most prominent naval architects and rivermen.

The continued success and expansion of Socony's petroleum distribution service on the Ohio, Mississippi and Missouri Rivers demanded additional equipment, resulting in the purchase of the St. Paul Socony to take its place with Socony's two other diesel towboats, the Kansas City Socony and St. Louis Socony, already well known to rivermen. The St. Paul Socony is considerably larger and more powerful than its two predecessors, and with its rating of 1500 hp it will be one of the most powerful diesel river towboats in existence in this country. Embodying many improvements gleaned from experience with its predecessors, the new vessel was completely designed in the Socony-Vacuum marine department. Even a cursory inspection of the boat will impress one with the fact that intelligent spending has not been spared to make this towboat one of the finest on the river. The completeness of its mechanical features is balanced by the comfort and appointment of the quarters.

The St. Paul Socony was built by the Ingalls Shipbuilding Corporation at its Decatur, Alabama, shipyard, and is of 100 per cent all-welded construction, resulting in an exceedingly trim and smooth appearance on both the hull and superstructure. The hull is of the twin-screw tunnel design with modified scow bow, and has the following dimensions:

Length molded	147′ 0″
Beam molded	35′ 0″
Depth molded	7′ 6″
Load draft	5′ 4″

The two main propelling engines and their auxiliaries are located in a well just forward of the midships, the remainder of the hull being reserved for tanks and buoyancy compartments.

Quarters

Directly below the spacious pilot house, and running the full width of the upper deck house, are the captain's quarters, consisting of a stateroom, private bath and separate office.

Directly aft of the captain's quarters is the engine room trunk and upper deck passageway, and aft of this, in the upper deck house, are the officers' quarters. On the port side are two double staterooms with a connecting bath to accommodate the pilot and assistant pilots, and directly aft of this, a commodious stateroom with private bath for the chief engineer.

On the starboard side are two double staterooms with connecting bath, accommodating the assistant engineer and two spares; and after this, a lounge comfortably furnished with chairs, table and settees. Aft of the lounge, the main deck house provides an open deck with arrangements for the spreading of an awning to give the effect of a veranda.

In the main deck house forward are the two diesel generator sets, outboard of which are two deck lockers for stowage of paint, rope and gear. On the port side, just abaft the locker, is installed the 100-cell Edison A-5 marine type storage battery. The generating equipment consists of two Superior vertical 4-cylinder, 65-hp at 500 rpm, 7 x 9 marine diesel engines, driving two 45-kw Century mica-insulated marine type generators. In the main deck house, aft of the engine room, are the crews' staterooms, opening each side of a passageway. On the port side are the crews' bath, stateroom for four oilers, and refrigeration space, outboard of which is a double stateroom for the cooks, opening directly into the galley. On the starboard side is a stateroom for four deckhands, double stateroom for two watchmen and another for two tankermen. At the aft end of the passageway are located the galley and a stateroom for two mates.

Extending across the full width of the aft end of the deck house is a messroom divided into two parts, one for officers and one for crew. The galley is equipped with an Edison electric range, and the sink, shelves, lockers and cabinets are furnished in gleaming stainless steel.

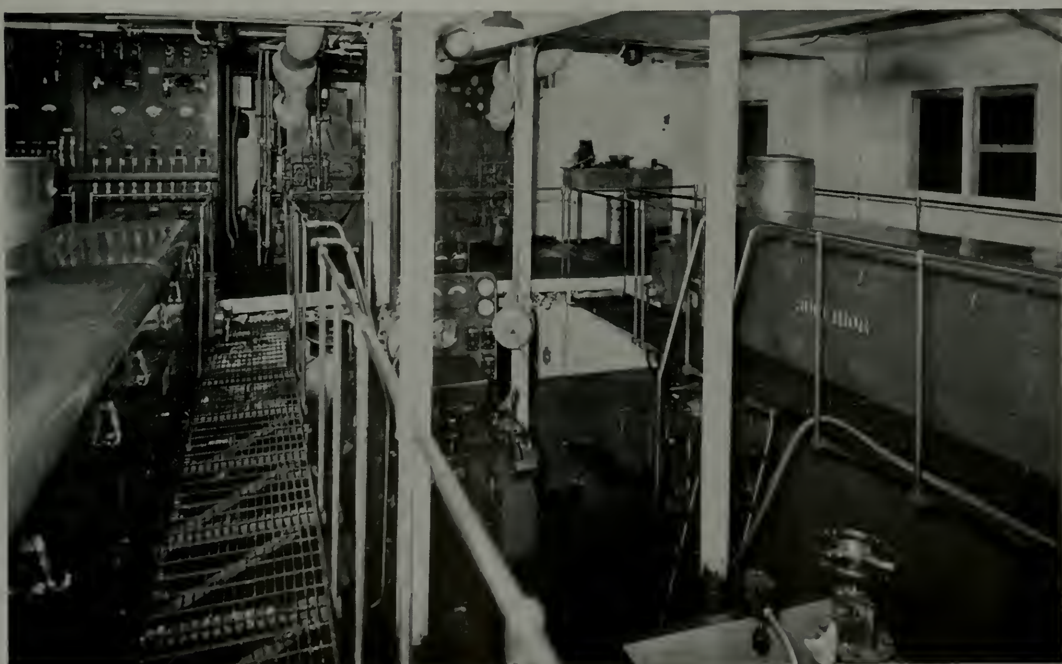
Furniture throughout the boat is entirely of steel, finished to represent dark walnut, and all tables, chairs and stools are of modern design of chromium tubing with leather-covered upholstery. Curtains and upholstery are sunfast and are thoroughly practical, both as to color and material.

Comfort for the officers and crew in cold weather is guaranteed by a complete steam heating system consisting of an American Radiator heating boiler installed in the engine room between the two main engines. The furnace is fired by a Silent Glow oil burner, and Shaw Perkins convector type enclosed radiators are installed throughout the quarters.

Somewhat unusual are the three separate water systems for wash, sanitary and drinking water. Each system is complete in itself, consisting of a storage tank and an automatic electric - driven pressure water set supplied by the Crane Company at Birmingham, Alabama.

Of special interest on the new towboat is the provision made for the comfort of the personnel through the introduction of forced air circulating facilities. An exhaust ventilating system takes the air away from under the ceiling, and the sheathing space throughout the accommodations is vented to circulate the air between the house insulation and the sheathing as an assistance in maintaining an equitable temperature in the rooms.

The pilot house is fitted up in the char-



Engine room upper grating, showing cylinders of main engine. At rear center are the generating sets; at rear right, the switchboard; and at lower center, the control stand for main engines

acteristic comfortable style, with a swivel chair for the pilot, in front of which are the engine telegraphs, manufactured by the Bendix Aviation Corporation, and on either side are located the steering levers. On top of the pilot house are two 18-inch Sperry incandescent searchlights, Perko navigation lights and, surmounting all, a full-size steel model of Socony's famous trade-mark, the flying red horse, "Pegasus."

Machinery

The two 6-inch hydro-electric steering gears manufactured by Thomas McLeod and Sons are equipped with Quimby constant-flow screw-type pumps, driven by Century 10-hp totally-inclosed marine type electric motors.

A high degree of maneuverability is essential for vessels operating on the inland waterways, and this point has been stressed on the St. Paul Socony. There are four rudders, one forward and one aft of each of the twin screws, with the rudders being so connected that the two on each side, fore and aft, act together. In addition to this, the controls may be interlocked so that all four rudders can be operated by one lever. Thus the pilot at all times may be assured complete control of the vessel. Another distinct innovation is that in emergency the towboat may be steered with power from the Edison storage batteries.

On the main deck forward are two American Engineering Company double-barrel Western river type capstans, driven by 15-hp Century marine type electric motors, and controlled by Cutler-Hammer controls and starters.

At the aft end of the deck house is a mast on which is mounted a derrick boom for handling the propellers, rudders, and also the two 18′ steel workboats. These boats are each equipped with a 10-hp Johnson outboard motor, and were supplied by C. C. Galbraith and Son, Inc., New York City.

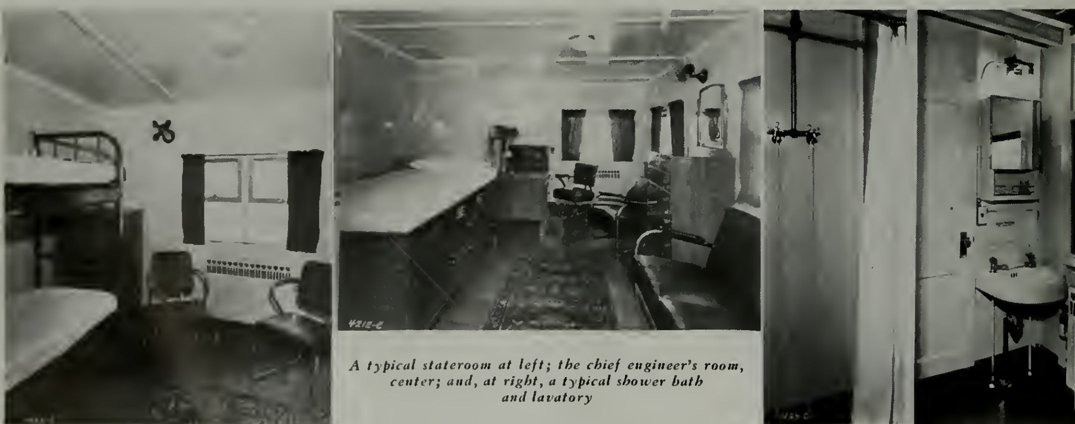
The pilot house

The main propelling machinery consists of two 8-cylinder Superior vertical diesel engines, $14\frac{1}{2}$-inch bore, 20-inch stroke, each rated 750 bhp at 300 rpm, giving the boat a total power of 1500. Each of the main engines is controlled by a single lever, which not only acts as a throttle but also controls the reversing of the engine. The two levers are mounted at a central control station in the forward part of the engine room so that the engineer on duty may be close to the generator and compressor units. Forced ventilation throughout the engine room assures comfortable working conditions under all temperatures.

Worthy of special note is the unusual arrangement for water cooling of the main and generator engines. Two complete separate and independent systems are installed, each system consisting of heat exchanger and raw and jacket water pumps. The systems are so connected, and of such capacity, that each system in case of emergency is capable of furnishing the entire cooling requirement for the boat. The two heat exchangers were furnished by the Condenser Service and Engineering Company, Hoboken, N. J., and each pumping unit consists of two 4-inch centrifugal pumps manufactured by the Weinman Pump Company of Columbus, Ohio, and driven on a common shaft by a Century 15-hp mica-insulated marine type motor.

This arrangement guarantees adequate cooling water under all conditions, and has the advantage over attached engine pumps in that the cooling system can be run after stopping the main engines, thus providing proper cooling for the machinery.

In addition to the customary hand fire extinguishers installed throughout the boat, the engine room is protected by a CO_2 manually-operated fire extinguishing system consisting of hose reel and four 50-pound cylinders of gas, manufactured by the C-O-Two Manufacturing Company and supplied by the Smith-Meeker Engineering Company of New York. Additional protection is afforded by a 2-inch Weinman centrifugal fire pump driven by



A typical stateroom at left; the chief engineer's room, center; and, at right, a typical shower bath and lavatory

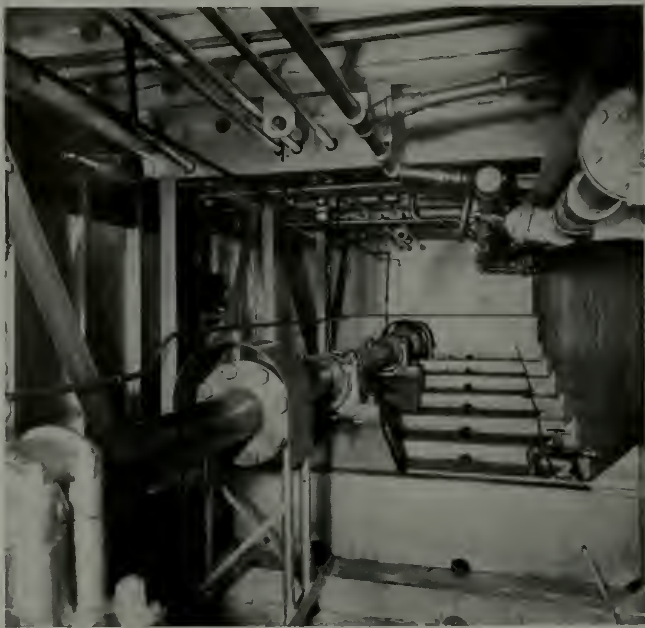
a 10-hp Century marine type motor, together with four 50-foot lengths of U. S. Rubber Company fire hose, installed in suitable locations on the boat.

High-pressure air for starting and reversing is furnished by two 2-stage vertical water-cooled Worthington air compressors located port and starboard in compartments forward of the engine room and driven by Century 20-hp marine type electric motors controlled by Cutler-Hammer controls. Four air tanks supplied by Wm. B. Scaife & Sons of Oakmont, Pa., are installed, two in each compressor room, and of sufficient capacity to guarantee a large reserve for starting and reversing.

All lighting fixtures throughout the boat are of modern design chromium plated, and complete electrical control of all circuits is centered at a switchboard installed on the port side at the forward end of the engine room flat, supplied by Smith-Meeker Engineering Company of New York. All machinery throughout the boat is equipped with electric starters and controls manufactured by Cutler-Hammer Inc., Milwaukee, Wisconsin.

After completion of decidedly successful dock and running trials on the Tennessee River during the first week of October, the St. Paul Socony left Decatur on its delivery trip to St. Louis. Of special note during the trials was a decided lack of unpleasant vibration throughout the boat when under way at near top speed.

With her glistening red deck house, bright green deck fittings and elaborate equipment, the St. Paul Socony was the subject of considerable complimentary comment as she passed through the locks going down the Tennessee. The most powerful and elaborate boat ever to be built on the Tennessee River, she should be Socony's most successful towboat, and a source of pride for many years to come, both to the owners, Socony-Vacuum Oil Company, Inc., and her builders, the Ingalls Shipbuilding Corporation.

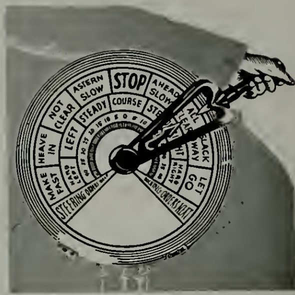


This view in one of the shaft alleys shows some interesting details of the all-welded steel hull, and illustrates the arrangement of bearings and bearing supports for the line shafting, of the piping systems and of guards for the couplings

These views of galley and dining room on towboat St. Paul Socony illustrate wise investment in crew health and crew comforts

Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT



A Department for Deck Officers

By **"The Skipper"**

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California

CARGO AND STOWAGE V

More On The New Examinations

Following the publication last year of specimen examination papers for all grades of licenses, numerous inquiries were received by the Bureau from ships' officers and others interested regarding the proposed date of inauguration of the new examination system.

The new examinations will be put into effect as soon as possible, but the actual date will be contingent upon the promulgation of the new revised Rules and Regulations of which the examinations are a part. The entire Ocean and Coastwise Rules and Regulations of the Bureau are in process of revision and, in accordance with the Bureau's policy, opportunity has been given to all to study and to comment upon the proposed changes and amendments. The public hearings will be held as soon as these preliminary studies have been completed, and the new examination system will be issued with the rest of the Rules and Regulations.

During this necessary interval, prospective candidates are advised to familiarize themselves with the forthcoming syllabi and with the type of questions with which they will be faced. As has been pointed out in previous Bulletins, the change consists for the most part of standardizing the present system and of bringing questions and methods up to date.

It has been very gratifying to the Bureau to note the preponderance of favorable comment on the proposals to revise the examinations and to maintain them in line with our revitalized merchant marine.

NOTE: A civil service examination will be held about the first of the year for Assistant Inspector of Hulls. "The Skipper" has on file the questions asked in the last examination, which was held April 3-4, 1940. If any of our readers are interested in obtaining a list of these questions, send in your request to "The Skipper" and you will promptly be sent a list.

QUESTION

What precautions would you take when stowing creosote?

ANSWER

Creosote is a tar oil, usually of yellow or brownish color, with a pungent odor. It is an inflammable liquid carried in barrels and drums, and should be stowed in an isolated place. It should be handled and stowed very carefully to avoid leakage, and the greatest care should be taken to remove all traces of creosote stains and odors after discharge before shipping the next cargo. Do not stow creosote in lower holds, owing to the impossibility of removing traces of leakage from wood ceiling.

Deck Officers' Licenses for September

Name and Grade	Class	Condition
SAN FRANCISCO		
A. M. Balkunas, Jr., Master	SS & MS, any GT	RG
D. L. Banks, Chief	SS, any GT	RG
G. J. Pollard, Chief	SS, any GT	RG
H. D. McLeod, Chief	SS, any GT	RG
K. A. Shannon, 2nd Mate	SS, any GT	RG
W. J. Carey, 2nd Mate	SS, any GT	RG
J. S. Cole, Jr., 2nd Mate	SS, any GT	RG
R. L. Bigler, 2nd Mate	SS, any GT	RG
J. H. Daly, 3d Mate	SS, any GT	O
Le R. Soares, 3d Mate	SS, any GT	O
SAN PEDRO		
M. E. Vash, Master	SS, any GT	RG
R. C. Emmons, 2nd Mate	SS, any GT	RG
G. H. Lee, 2nd Mate	SS, any GT	RG
HONOLULU		
J. M. Van Orden, Chief	SS & MS, any GT	RG
PORTLAND		
S. G. Gurganus, 2nd Mate	SS & MS, any GT	RG
O. W. Krohn, 2nd Mate	SS & MS, any GT	O
D. A. Lee, 2nd Mate	SS & MS, any GT	RG

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

QUESTION

Where would you stow a cargo of dates?

ANSWER

Dates are the fruit of the date palm, exported in considerable quantities from Tunis, Persian Gulf ports, China, etc., both in the wet and dry condition. Fine picked dates are generally shipped in cardboard boxes packed in cases, and require good cool stowage. Wet dates are usually shipped in cases, and require careful handling, as they are frail. They should be stowed well away from goods liable to damage on long voyages, as the juice often drains from them, and they frequently cause a lot of sweat in the hold.

Cases of dates should not be stowed with their ends landed on beams, stringers, etc., as there is a certain amount of "shrinkage" in a date cargo, and it is often found that cases stowed in this manner are in pieces and will not bear handling on discharge.

QUESTION

State what you know of the carriage of deck cargoes. What is the special feature to be careful about?

ANSWER

Under this heading we include all goods that are carried on the open decks of a vessel, and have no reference to covered-

in deck spaces, such as bridges, poops, etc., or to tonnage openings.

Deck cargo may be mentioned under three headings:

(1) Those that are carried on deck because they are "dangerous."

(2) Those that are of necessity carried on deck because, owing to their size or shape, they cannot be stowed underdeck.

(3) Those that are carried on deck because the vessel is full underdeck but not down to her loadline.

Deck cargo should be at shipper's risk, to ensure which it is necessary that mate's receipts and bills of lading be clearly endorsed "On Deck at Shipper's Risk."

Should more cargo have been ordered than can be stowed below deck, which is suitable for "on deck" stowage, and that course be decided upon, it necessarily will be at ship's risk, which risk should promptly be covered by insurance.

Notwithstanding that deck cargo is at shippers' risk, liability for loss of or damage to same may rest with the ship in certain circumstances, of which the following are examples:

That due diligence and practical measures were not observed in securing and preserving the cargo.

That the stowage was negligent or improper, such as by over-stowing weak packages with heavy goods, etc.

Should "dangerous goods" be carried on deck, the packages should not exceed in size or weight that which can conveniently be handled should the necessity arise to jettison same in the interest of the safety of crew or ship. When such goods are carried, care should be observed, lest by stowing certain commodities in close proximity, the normal risk to be apprehended from the several commodities regarded separately be thereby increased.

If carrying compressed gases in cylinders or other cargo which, under the action of the sun, is liable to expand to a degree which increases the risk of accident, or any other goods which it is desired to protect from direct heat of the sun, the use of black or dark-colored covers should be avoided, as such retain heat.

When deck cargo is carried, access to all important parts of steering gear, boats, bilge sounding pipes, etc., should be preserved; and where such is called for, properly-made and protected gangways should be provided for the crew.

If heavy articles are carried on deck, such as castings, forgings, machinery, etc., they should, if possible, be placed so that the heaviest part is over the bulkhead below; the decks should be given additional supports by perpendicular shores placed under and over beams wedged up hard with fine wedges.

Proper ring or eye-plates firmly riveted or bolted to the deck or stringer plate should be provided for lashing heavy cargo of this kind.

If dunnaging under heavy deck cargo spread over the deck, the boards should be laid diagonally at an angle of about 45 degrees to avoid buckling of deck plates.

QUESTION

Where would you stow earthenware, and how should it be protected?

ANSWER

This cargo is shipped both in bulk, either protected by straw binding or totally unprotected, and in large crates. Loss through breakage is almost unavoidable, but unless very carefully handled, the loss is apt to be serious and productive of claims.

Earthenware pipes are usually nested in paris, when the nature of shipment permits such.

When fairly large shipments of earthenware pipes and like ware are made, it is not unusual for shippers to have their representative in attendance to direct the stowage, and in some ports it is the practice for freight to be based on actual space occupied by the ware, measured after stowing.

Earthenware should always be stowed in 'tween deck spaces, and if these are deep, it is best to stow over a tier or two of firm cargo laid on deck in order to reduce the top weight on bottom tier of earthenware as much as possible. Straw is usually used for stowing this cargo, and if light case goods are available, they should be used for beam fillings, and so act to secure top tier from movement when vessel rolls.

QUESTION

Where would you stow a part cargo of inodorous felt, and what would you particularly guard against?

ANSWER

Felt is an odorless cloth made from flax, jute or similar refuse treated with rosin previously moistened by mixing with oils of various kinds. Owing to its liability to spontaneous combustion, it is classed as dangerous cargo.

Most shipping companies only receive this for carriage on deck. If stowed below, stow in a cool place near the hatch where it is easily accessible.

QUESTION

Where should firecrackers be stowed?

ANSWER

Firecrackers are shipped in considerable quantities from Hongkong, Shanghai and other Eastern ports. They are usually packed in very fragile cases covered with matting, which are quite unsuitable for over-stowing with other cargo; come in very handy for beam filling over dry cargo, but not for broken stowage. To avoid crushing, they should not be slung with other cargo. They are classed as dangerous material, first category, by the Suez Canal Authorities, whose Regulations impose severe restrictions on vessels carrying first and third category goods in the same hold.

QUESTION

What is flax, and does it require any special stowage?

ANSWER

Flax is the fiber of the inner layer of an annual herb, from which linen is made. It is grown and shipped from Russia, Italy, India, Argentina, Australia, New Zealand, etc. In Eastern countries, flax is chiefly grown for the oil obtained from its seed, but in colder climates the fiber is principally used. It is shipped in bales, and requires no special stowage, but should be well dunnaged between wool, copra or articles of an oily nature; in any case dunnage and mat this cargo well and take precautions against fire. Care should be taken not to ship this in a damp condition, or it is liable to spontaneous combustion.

QUESTION

What particular care should be taken in the stowage of flour?

ANSWER

Flour is a delicate cargo carried in barrels, sacks or bags. It is very liable to damage by tainting if stowed near to or in same compartment as odorous goods; also readily damaged by moisture; so that flour should always be stowed apart from odorous, wet or oily goods, or such as are liable to heat and throw off moisture, and should never be stowed on or with newly-sawn lumber.

Large claims have had to be met for flour damage as the result of having been stowed over maize and other cargoes liable to heat and throw off moisture; such stowage should be avoided at all costs.

Flour is particularly susceptible to damage by turpentine and spirit fumes, and should not be received into a vessel carrying the latter, unless stowage can be so arranged that the turpentine, etc., is separated from the flour by the engine and boiler-room spaces.

Flour barrels lose a great deal of their contents if rolled about to any considerable extent, which sometimes is done to

avoid trucking; from this cause, claims for short weight frequently arise.

Flour barrels should never exceed eight heights in stowage. The ground tiers should be well bedded, and light cargo used for over-stowing.

Bag flour should be well dunnaged and kept from contact with bulkheads, pillars, etc., by the use of mats, etc. The use of hooks for handling bag flour should be strictly forbidden.

QUESTION

What is the most essential thing to be considered in the carriage of green fruit?

ANSWER

The most important thing to consider as regards the carriage of green fruit is ventilation, as no matter in what condition fruit is shipped, if it is not properly ventilated decomposition will soon set in and it will quickly decay.

For relatively short voyages, through temperate latitudes, green fruit, if picked at the right time, carries, with natural ventilation, without undue loss. Apples from North America, oranges, lemons, grapes and onions from the Mediterranean and North Atlantic Islands, form the bulk of fruit carried under such conditions.

When a mechanical system of ventilation is not provided, it is both necessary and customary to form large vertical air shafts, by means of boards and cases, extending from the hatchways and from underside of ventilators to the bottom of compartments, where they connect with gutters or air passages, formed of cases, leading to the sides. These in turn connect with similar air passages leading fore and aft through the cargo, all being designed to ensure the best possible circulation of air through the mass of the cargo, by which means only can it be kept cool and the heated air and gases which the fruit throws off discharged, this being necessary in order to retard the natural process of ripening. In some trades it is customary to arrange side and fore and aft air passages at more than one level.

With onions in bags, these air passages are formed by introducing wooden open-sided trunks of the kind used with rice cargoes.

Further, to assist in the ventilation, the cases of fruit are loosely and not compactly stowed, air spaces of 8″ to 10″ clear being left at and across the bulkheads, the stowage stopped 8″ or 10″ short of deck beams, and laths laid athwart, between the tiers. Owing to the difficulty of adequately ventilating lower holds, it is seldom that such are utilized for more than a limited quantity of green fruit.

Fruit compartments, bilges, etc., should be thoroughly cleaned and sweetened, and 'tween deck scuppers cleared.

Green fruit should not be stowed with or over any cargo that is odorous, moist or liable to heat, as it is likely to receive damage from such; while, on the other hand, edible and delicate goods, such as tea, coffee, eggs, vermicelli, macaroni, dried fish, flour, etc., are readily damaged if stowed with or near green fruit.

Hatch covers should be kept off whenever weather conditions permit; sometimes booby hatches are fitted over hatch coamings so that the hatches can remain uncovered and, at the same time, ensure that rain or spray does not wet the cargo.

Decomposed fruit throws off poisonous fumes, and a number of fatal accidents have resulted owing to men's having entered ill-ventilated compartments or recesses containing, or which recently had contained, decomposed fruit.

QUESTION

Where and how would you stow galvanized iron?

ANSWER

This is iron coated with zinc. It is usually in sheets, which are often corrugated, and are carried in various packings, but generally in crates and cases. These cases are very heavy and should be well stowed. The method of stowing naturally depends on the available space or position in the vessel, but the cases must always be stowed on a flat surface to avoid distortion. It is sometimes the practice to stow them on their edges in the lower holds, especially where it is necessary to load much cargo above them; in such a case they should be well floored over with dunnage. It is preferable, however, if convenient stowage is available, that they should be stowed in the 'tween deck on a good flat surface with only light cargo above them. When laid on their flats, particular care should be taken that the corners or edges of the cases are not "hung up" on beams, stringers, tunnels, etc., otherwise they will be seriously damaged. Care should be taken that these goods are not worked in rainy weather, and also that they are handled carefully, as the packings are usually frail, and the contents being heavy, considerable damage may easily be caused by the plates being bent or buckled, especially at the corners. It is desirable to ensure that the zinc coating be perfect, for if the coating be damaged, the iron will rust, particularly if it be exposed to moisture and varying temperatures.

QUESTION

How would you stow plate or sheet glass?

ANSWER

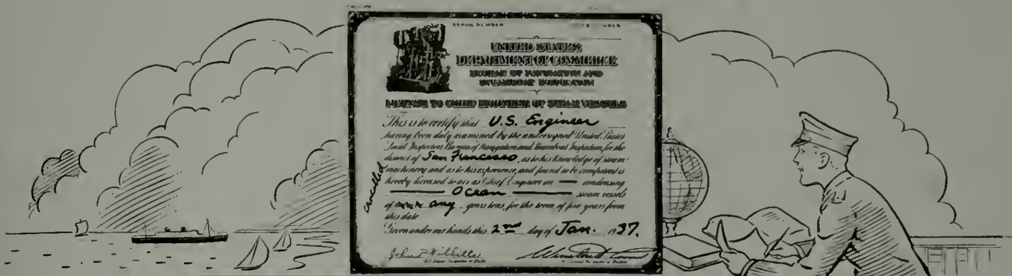
This is a very fragile cargo, requiring great care in handling and stowing to avoid breakage. Plate and window glass is packed in strong crates or cases, which should be devoid of battens on the outside edges to enable them to rest on deck, etc., for their entire length. They should be stowed on firm ground, on the 'tween deck preferably, with extra large and heavy packages in square of hatch for ease of handling. On no account should glass be stowed on top of any cargo liable to settle, such as coke, bagged stuff, etc.

Dunnage should not be resorted to, as it is preferable for the package to be supported along its entire length.

Crates and cases of glass should always be stowed on edge, and in all cases plate glass should be stowed athwart. The general run of window glass will stow satisfactorily fore and aft, if desired.

It is essential that the crates, etc., be well chocked off, and all broken stowage filled with suitable material in order to reduce to a minimum any movement in a seaway.

Slings of glass should be made up in such a manner that the deeper packages are central and the smaller on the outside, grading upwards towards the center, thus avoiding the rope sling straining the crates, etc., at their upper edges, with disastrous results to their contents.



Your Problems Answered by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California

Marine Boilers—VI

HEATING SURFACES

In our last issue, we discussed circulation as the second fundamental point in boiler design, and pointed out that the methods of obtaining circulation were the principal differences between the standard designs of marine boilers and the many new and odd types of designs to be discussed later. In this issue we discuss heating surfaces. Fundamentals yet to be discussed are: bottom drums, selection of materials, safety factors, accessibility, directed gas flow, ratings and fittings.

QUESTION

What are some of the design factors in determining size and shape of the combustion chamber?

ANSWER

Under the subject of combustion, to be discussed later, it will be shown that the mixture of fuel and oxygen must be complete before combustion can take place. Fuel not in contact with oxygen, but raised to ignition temperature, may form other products, such as carbon or soot, of which there are several forms, many of which, once formed, will not ignite when finally in contact with oxygen, or burn more slowly, so as to be burning after leaving combustion chamber.

The volume of the combustion chamber must be large enough so that the maximum rate of fuel burning will make a flame which is wholly within the limits of the chamber or space. The reason for this is that if the flame is allowed to impinge on the heating surfaces, which are at boiler temperature, the temperature of the flame will immediately be reduced to a low value, probably below the burning or ignition temperature, which will leave unburned fuel in the form of soot or carbon monoxide to pass on up the stack.

If the flame impinges on fire brick at the end of the furnace, the surface of the brick will be raised to flame temperature, and eventually flake or melt slightly, or glass over, which is to be avoided, if possible. Thus combustion should be complete before the space of the furnace is left. This leaves nothing but hot gas to pass through the heating surfaces. The flame as such is visible because it is filled with incandescent particles of unburned carbon or fuel. It must not be cooled down.

The shape is determined to some extent by tube arrangement, but mostly by shape of flame as caused by the burners, their number and location. A large number thus causes a broad or high front to the furnace, and may force the hot gases from one flame to mix or pass through the flame of another burner. On the other hand, by increasing the oil-burning capacity of a burner and reducing the number of burners, the breadth and height of furnace may be reduced and length of furnace increased. This is a modern trend.

The Scotch boiler cylindrical furnace is not the best shape, as far as meeting theoretical requirements is concerned. The flame must make a right-angled bend at the back into the combustion space, which

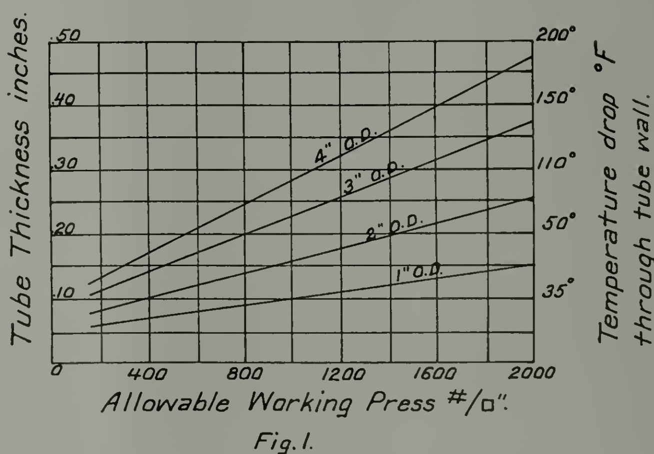


Fig. 1.

is all water-cooled; hence much of the flame is cooled before complete combustion. Preferably nothing should touch the flame. Outside the flame envelope we may guide the gases at will.

Unused volume in the furnace, such as corners and odd shapes not needed, besides being wasteful of space, give rise to eddies and possibly gas pockets. If there are any parts of a ship which should be streamlined, they are the furnace and the gas passages.

Factors which cause unnecessary pressure drop in the movement of gases through should be avoided. Thus the gas velocity should be approximately the same all the way through. This means approximately the same sectional area with allowances for the increase in volume at combustion, then gradual decrease as the gases are cooled off. Sudden changes in velocity lose pressure. Sudden changes in direction of flow drop pressure.

Obviously the smaller the amount of brick lining needed in a furnace, the better. Thus if not in the flame, the furnace walls can be cooled by boiler water in the form of tubes. In one make of modern boilers two rows of tubes of fairly small diameter are built into the walls and floor and roof, faced on the outside with heat insulation, the floor having refractory cement over the tubes. Another make forms the surfaces of the furnace with fairly large tubes, and connects them with iron blocks, making good thermal contact with the tubes, thus presenting an all-metal surface to the combustion space. Water-cooled walls, floor and roof pick up much heat by radiation, thus reducing the number of tubes in the gas passages, with the resultant reduction in pressure drop and weight of tubes and refractory walls.

A furnace must be air-tight. Even the smallest cracks and air leaks upset the combustion efficiency and cool the boiler with excess air. Furnaces at one time were considered as necessarily operating under a negative pressure. That is, air from the room will leak into the furnace. The suction from natural or induced draft carried out the gases so fast that there was a suction on the furnace. This was also considered important to prevent the flame or hot gases from blowing out into the room. It was considered necessary, when mechanical draft was used, either to put entire fire room under pressure or to induce an outward draft in the gas passages by the use of a suction blower. The Howden System was the first marine induced and forced draft application to Scotch boilers. With modern boilers, both forced and induced draft blowers will be used, but the furnace is so constructed that it may be under slight positive pressure; that is, if an opening were made, or a door opened, flame and gases would come out into the room. Sight holes are covered with Pyrex glass, sometimes blue colored to protect the eyes. This does not mean, however, that it would be safe to allow such a pressure on the furnace that the induced or suction blowers could be omitted. If all the draft pressure were concentrated on the forced or fresh air side of the furnace, the furnace pressure would be too great for safety.

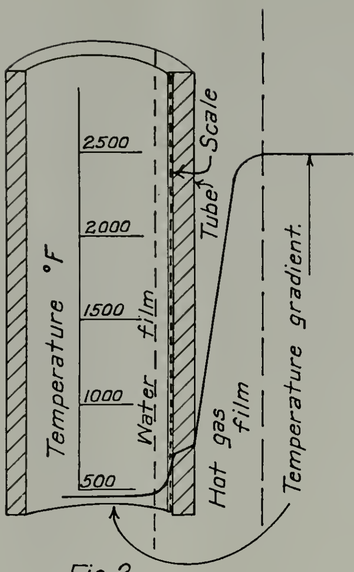


Fig. 2

QUESTION

What determines the size and arrangement of the tubes?

ANSWER

First, as to tube size. Refer to Fig. 1 and note the relation of tube wall thickness as related to tube diameter. Note also the approximate temperature drop through the tube wall with different thickness. The diameter versus thickness curve is taken from the formulas in the General Rules and Regulations. The smaller the diameter, the thinner the wall, and the thinner the wall, the less the temperature drop through the wall. Thus the smaller diameter tube appears desirable. Furthermore, since sectional area of tube is .7854 times inside diameter squared, the weight of water in the tubes is proportional to the diameter squared. The surface area is proportional to the diameter. Thus the smaller the tube diameter the greater the surface per unit volume and weight of water.

Boiler design, like all other machinery units, is a compromise between opposed controlling factors. There is a limit or minimum diameter of tube which is practical from a mechanical and cost point of view. There is a minimum thickness below which tubes cannot be rolled tight into headers or drums. The number of tubes and cost of installation, as well as cost of tube per pound, increases with the decrease of diameter.

Another limit on minimum tube diameter is area to supply circulation of water and prevent steam blocking. When too small, circulation requires a greater differential head, with possibility of not keeping the upper ends of tubes wet. If tube fills with steam on overloads, tube will overheat.

The tube diameter, as found on your boiler, has been selected after a very careful balance of all opposing factors.

Tube arrangement is important. First, it must be possible to replace a blown tube without removing too many good ones. They must be accessible for inspection and for soot blowing.

The arrangement must be such as to thoroughly mix with the hot gases and prevent any gas from blowing straight through a bank of tubes without scrubbing the surfaces. The rate of heat transfer from a gas to a metal increases rapidly with gas velocity. Thus the gases must be blowing on the tubes with considerable force. One tube should not be in the lee of another.

When the gas stream is at right angles to tube length, usually only about one-half of tube area is effective in absorbing heat, as the back side of the tube is sheltered from the heat blast rushing past and against the tubes. Some boiler designs are arranged so that the gases stream along more or less parallel with the length of the tube, others scrubbing the tube around its entire circumference. To get the longitudinal gas flow, however, requires other restriction, and the trend in designs seems to be toward higher gas velocities with the greatly accelerated pickup of heat, using only the upstream side of tube. The high velocity greatly increases heat flow through the principal heat resistance in the hot gas film. See Fig. 2.

The rate of heat transfer from hot gas to water per square foot of heating surface has increased many fold with modern boilers. Three to four pounds of steam at low pressures were considered good evap-

oration per square foot of heating surface in the old plants. Today modern boilers evaporate, at normal ratings, 6, and at maximum ratings, 9 and more, pounds of steam per square foot of heating surface per hour. Comparisons of this character are misleading, as pressures determine heat transferred for evaporation, and details such as the degree of water heating accomplished outside the boiler, whether or not superheaters are used, and many other factors make the comparison difficult.

To make all corrections and put evaporation on a common basis of from water 212° F. to steam at 212° F., rates are normal at from 15 to 25 lbs. per square foot per hour. This is equivalent to transferring about 15 to 25 thousand Btu per square foot per hour through the tube wall.

This rate may be doubled or doubled again in transfer through tubes in furnace walls which receive the heat by radiation.

The design of the entire heat transfer system is to discharge the gases to atmosphere at as low a temperature as is possible. In earlier days 800° F. was considered a low stack temperature. Now the figure is 300° F. It cannot be lowered farther, as condensation of moisture in the stack would occur, with formation of sulphurous acid from the sulphur content and water. This would go to sulphuric acid shortly, and erode the steel of the stack passages. These low temperatures are obtained by transferring heat in the stack to the incoming fresh combustion air.

Our next article will deal with drums, materials and safety factors.

Engineers' Licenses for September

Name and Grade	Class	Condition
SAN FRANCISCO		
J. Freeman, Chief	SS, any GT	RG
G. McCray, Chief	SS, any GT	RG
D. A. Rowen, Chief	SS, any GT	RG
E. C. Berlin, Chief	SS, any GT	RG
A. S. Marshall, Chief	SS, any GT	RG
J. D. Gillis, Chief	SS, any GT	RG
H. S. Francis, 1st Asst.	SS, any GT	RG
M. E. Basner, 1st Asst.	SS, any GT	RG
E. F. Nessmith, 1st Asst.	SS, any GT	RG
E. Spencer, 1st Asst.	SS, any GT	RG
W. W. Wheeler, 2nd Asst.	SS, any GT	RG
P. M. Magnari, 2nd Asst.	SS, any GT	RG
J. Robertson, 2nd Asst.	SS, any GT	O
J. Layin, 2nd Asst.	SS, any GT	O
M. L. Nelson, 2nd Asst.	SS, any GT	O
C. B. Barton, 3d Asst.	SS, any GT	O
G. D. McBride, 3d Asst.	SS, any GT	O
W. C. Blake, 3d Asst.	SS, any GT	O
A. Beckstrom, Chief	MS, any GT	RG
J. D. Gillis, Chief	MS, any GT	O
SAN PEDRO		
E. C. Wissing, 1st Asst.	SS, any GT	RG
F. H. Williamson, 2nd Asst.	SS, any GT	RG
A. F. Rico, 3d Asst.	SS, any GT	O
H. H. Bleck, 1st Asst.	MS, any GT	RG
HONOLULU		
R. D. Donovan, Chief	SS, any GT	RG
SEATTLE		
F. Mills, Chief	MS, any GT	O
PORTLAND		
M. W. Grauel, Chief	SS, any GT	RG
P. D. Blanchard, 1st Asst.	SS, any GT	RG
C. F. Nelson, Chief	MS, 300 GT	O
1st Asst.	MS, 450 GT	
H. E. White, Chief	MS, 300 GT	O
1st Asst.	MS, 450 GT	

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

Tremendous Expansion For Turbine Plant

The Westinghouse Steam Division Works at Lester, near Philadelphia, Pa., will expand present facilities at a cost of over $9,500,000 to assure on-time delivery of turbines for 45 fighting ships of the United States Navy. The Navy vessels include battleships, airplane carriers, cruisers and destroyers.

Recent contracts to Westinghouse for steam turbines total over $64,500,000, and have established a new record backlog of orders for the Steam Division. In addition to the Navy equipment, land turbines and ship propulsion apparatus for the merchant marine are included. This machinery will total about 5,000,000 horsepower, of which 3,000,000 will be used to drive Navy ships. Several of these turbines are destined for marine or land use on the Pacific Coast, including the 65,000-kilowatt turbine ordered recently by Los Angeles for power generation.

Payroll of the Steam Division Works of Westinghouse has reached around $1,000,000 a month, a new high. This amount is paid to 4,000 employees, largest force employed since 1921, and 66 per cent more than were employed there a year ago.

The plant expansion program includes a three-story headquarters building, now under construction, which will be occupied in December. Additional manufacturing space will be provided and present facilities rearranged to permit top-speed manufacture. Present rate of production will be increased by four times for some types of Naval equipment. Over $5,000,000 worth of machine tools and other manufacturing equipment are being installed as rapidly as they can be obtained.

Manufacture of big power apparatus is always a matter of months, even years. This new expansion is in line with the determination of Westinghouse to keep deliveries on schedule. In 1940 the Steam Division will turn out nearly $10,500,000 worth of the machinery now on order. In 1941, delivery of another $22,000,000 worth will be made; and in 1942, another $25,500,000. Only $6,500,000 of this backlog is scheduled for 1943 and later.

Contracts for 271 ship-propulsion steam turbines for the Navy are among those being rushed to fulfillment. Their combined 3,000,000 horsepower, if converted to electricity, could meet the household electric requirements of all the 30,000,000 homes in the United States.

In addition, the Steam Division will provide the Navy with many steam turbogenerating sets and mechanical drive turbines for auxiliaries.

Fifty ship-propulsion turbines also will be constructed for merchant marine vessels. These machines, totaling more than 250,000 horsepower, will be installed in 17 tankers and 4 cargo ships. Lighting equipment for 16 merchant marine vessels, and auxiliary apparatus, also have been ordered.

Orders for 57 shoreside steam turbines, with a combined capacity of a million kilowatts, are being filled. These are the prime movers used in power plants throughout the nation. Some of these turbines will weigh up to 360,000 pounds. Over 70 mechanical drive turbines also are being constructed for land use.

Vibro-Insulator Application

Applications of Vibro-Insulators, the combinations of rubber and metal used to eliminate vibration, have had a wide scope, a recent bulletin of The B. F. Goodrich Company, manufacturer of the devices, declares. A partial list of some of the more extensive illustrations follows:

Electric motors, large and small; air compressors; punch presses; internal combustion engines, gasoline and diesel, automotive marine, stationary; ventilating fans and blowers; electric switchboards; weighing scales; delicate balances; compressors for electric refrigerators; radiators for cooling liquids; heavy mills; vibrating screens; trolley bases on trackless trolleys; motor-generator sets; high-speed grinders and buffers; slow-speed roll grinding machines; wire-drawing machines; business calculating machines and tabulators; electric typewriters, or "teletypes"; airplane instrument panels.

Pacific NORTHWEST MARINE REVIEW

by Special Correspondent

Harbor Island Shipyard Center

Harbor Island, between the East and West waterways at the head of Elliott Bay, Seattle's main harbor, promises to become the great shipbuilding center of the city, as differentiated from the situation during the World War boom, when the largest of the shipbuilding plants were located along the main south waterfront on the city side of the bay. On the island is already located the great repair yard of the Todd Shipbuilding and Drydock Co., now engaged, among other activities, in a five-million-dollar conversion contract for the Government on the former American Mail liners President Jackson and President Grant, and adjacent to it the site is already being cleared for the new five-million-dollar shipbuilding plant of the Seattle-Tacoma Shipbuilding Corporation, which has just been awarded a contract to build twenty destroyers at a cost of $137,500,000. Also on the island is the plant of the Puget Sound Bridge & Dredging Co., which recently joined with the Lake Union Drydock & Construction Co. in the formation of the Associated Shipbuilders, which will bid for the construction of seaplane tenders, mine sweepers and mine layers under the thirty-five-to eighty-million-dollar program the Government has announced for ships of this class. This plant is already building $400,000 worth of barges for the Federal Government.

The Lake Union Drydock plant is located on Lake Union inside the canal; and the Lake Washington Shipyards, also engaged on a big program of construction, is located on the east shore of Lake Washington, across from Seattle.

Puget Sound Shipbuilding

A summary of the work already under way or contemplated in this district shows the following situation:

Seattle-Tacoma Shipbuilding Co., Tacoma plant (Todd's), building five C-1 standard type freighters for the Maritime Commission at a total cost of over $10,000,000, and with contract for four C-3 steamers at a total cost of over $12,000,000, two of which have already been launched.

Seattle-Tacoma Shipbuilding Co., Seattle, work on new plant just started to build twenty destroyers, already contracted for at a cost of $137,500,000.

Puget Sound Navy Yard, Bremerton, ten destroyers, $70,000,000; and auxiliary vessels, approximately $12,000,000.

Todd Drydock repair plant at Seattle, conversion of President Madison and President Grant, $5,000,000, with possibility of similar conversion of two more vessels of this type.

Lake Washington Shipyards, four submarine net tenders and new survey boat, Pathfinder, which combined will cost $3,500,000.

Sagstad yard, Motor Survey Boat Patton, wood construction, $170,000.

Associated Shipbuilders, Lake Washington Shipyards, Winslow Marine Railways, all bidding on program for new seaplane tenders, mine layers and mine sweepers. Bids on these will be opened as follows: seaplane tenders, October 16, either two or eight ships at an estimated cost of five million dollars each; mine layers, October 23, two vessels at estimated cost of ten million dollars each; mine sweepers, October 31, two to eight vessels to cost $2,500,000 each.

In addition to this immense amount of work in prospect on which Seattle yards hope to obtain at least a share, it has been announced from Washington that the Seattle-Tacoma Shipbuilding Corporation is the sole bidder on the construction of the two largest passenger liners ever built in the United States. These two vessels for the Maritime Commission would cost a total of $46,000,000. More definite announcement on any of the above contracts may be made by the time we go to press.

Seattle and Tacoma yards will be among those submitting bids for the three large Coast Guard cutters similar to the Ingham and Spencer, which the Government plans to build at a cost of about ten million dollars. The new vessels are to be 327 feet long, and will have a speed of about 20 knots. The large cutters of this type previously on the Coast have been sent to the Atlantic for neutrality patrol, leaving a need for more cutters on the Pacific.

American Mail Line

Most significant news of the month in the shipping field was the announcement by the Federal Maritime Commission that it had allocated nine new ships to Puget Sound's American Mail line. It is considered that this new addition to shipping facilities will have a far-reaching effect in stimulating the commerce of all of the Pacific Northwest points, as A. R. Litner, general manager of the American Mail Line, states that it will now be possible to extend the service to include Oregon as well as Puget Sound ports. The first three ships will be of the C-1 type, five of which are now under construction at the Todd yards in Tacoma, while the other six will be of the larger and faster C-2 type. All will be freighters, with limited passenger accommodations. The C-1's are designed to make 14 knots, the C-2's 16½. As the ships the company is now operating only make 10, with the new boats it will be possible to reduce the round trip time to the Orient from 90 to 56 days. The new ships will be made available as rapidly as possible, starting the first of the year, to replace the six 20 year old vessels the company is now operating. Under the new agreement with the Maritime Commission, a minimum of 20 sailings from Puget Sound and 12 from the Columbia River will be called for.

Nickum Office Very Busy

The office of W. C. Nickum & Sons, naval architects, is a busy spot these days, with the various duties they are being called upon to perform in connection with the Government's shipbuilding program. In addition to surveys and supervision and working out the details on other jobs, they are also preparing detail designs for the new Government submarine net tenders. Sixteen of these will be built in four different yards, four each going to the Lake Washington Shipyards at Seattle, the Commercial Iron Works at Portland, General Engineering & Drydock Co. at Oakland, and the Marietta Mfg. Co. at Point Pleasant, West Virginia. They are also handling the supervision and designing details on the five-million-dollar conversion of the President Jackson and President Grant.

Revival of Siberia Trade

Reminiscent of the Russo-Japanese and the World War days, there has been a very definite revival in the Puget Sound trade with Siberia. So rapidly has shipping expanded between Seattle and Vladivostok that not only have six Russian vessels been put on the run, but the Armtog has also leased the Pacific American Fisheries Company's vessels, the Mary D, North King and Clevedon, and also the Girdwood Shipping Company's freighter Admiral Cole, all sailing out of Puget Sound, with other vessels making ports in the south. One of the principal items of the trade recently has been an immense consignment of oil pipe from Pittsburgh to Vladivostok. The Russian vessel Artica recently in Seattle took on a cargo of 3,000 tons of this consignment, which it is understood totals 22,000 tons.

Record Wood Pulp Shipments

Northwestern wood pulp manufacturers exported more pulp during the month of August than in any other August in their history, the figures, 60,379 tons, valued at $3,998,000, being exceeded only by the exports in July of this year.

Alaska Air Bases

The construction of the huge new naval and army airports in Alaska has created a great expansion in trade with the north, as millions of dollars worth of machinery and supplies and thousands of men have been rushed north to Fairbanks, Anchorage, Sitka, Kodiak and other sites of new air base construction. Among vessels to leave recently with big cargoes were the army transport St. Mihiel, the Chirikoff and Kvichack, and the Navy transport Spica.

The S.S. Northwestern, purchased recently by the Navy Department from the Alaska Steamship Co., sailed on October 1 for Dutch Harbor, where she will be used as a floating hotel to relieve the housing shortage among the workmen at the new air base at that point.

Many Boats Planned

H. C. Hanson, Seattle naval architect, has a number of interesting jobs on his boards at the present time. One of these, a Government job, is the motor survey vessel Patton, for the U. S. Coast & Geodetic Survey. She will be 88 feet long, 21 foot beam and 8 foot draft, and will be powered with a pair of 150-hp Cooper-Bessemer diesel engines. She will be of sawn-frame type wood construction, and will cost about $170,000. Construction is to be done at the Sagstad yard at Seattle. Hanson is also designing a new ferry for use at Keller, Washington, on the Columbia River near Grand Coulee Dam. This boat will be a 60-footer, 30 foot beam, powered with a 100-hp diesel. Plans have also been completed for a 120x34 foot oil barge for the Alaska River Navigation Co., McGrath, Alaska, to be built of all-welded steel.

Northwest-Built Steamers Sold

It is interesting to note that sixteen of the twenty-five old steel steamships on which the U. S. Maritime Commission recently called for bids, and which will probably be transferred to British register, were built in the Pacific Northwest during the World War. Seven were built in Seattle, one in Tacoma, two in Vancouver, Washington, and six in Portland.

Maritime Briefs

Bering Sea Patrol: With the greater part of the commercial tonnage out of the Bering Sea until next spring, units of the Coast Guard Bering Sea Patrol are either back on their regular stations or heading south.

Twenty-five-Knot Fish Boats: Two fishing boats of an unusual design are nearing completion at the yards of Sunde & Olson, Seattle. Both are forty-footers planned to make a speed of from 25 to 30 miles an hour. They will be used in mackeral fishing off the California coast, and are for three cousins, Sig Brandal and Art and Sverre Anderson. One boat will be equipped with two Buick engines of 80 hp each, the other with twin 78-hp Packards. They will engage in dipnet fishing off San Pedro.

Naval Reserve Armory: With much ceremony, which included speeches by the governor and others, and in the presence of naval and reserve officers, ground was broken in Seattle recently for the new United States Naval Reserve armory, which is to be built at the foot of Lake Union in Seattle. It is a combined State and WPA project designed to accommodate 2,000 officers and men of the Naval Reserve and the Marine Corps.

Improve Alaska Harbors: Included in the funds which the President has requested Congress to appropriate immediately for river and harbor improvement is $109,000 to improve the harbor at Sitka, Alaska, for naval seaplane operations, and $70,000 for Kodiak to provide a 22-foot channel for the naval air base.

Smith Wilson, president of the Port of Seattle Commission, is greatly pleased over the figures showing that the Washington district, including the Port of Seattle, registered the greatest value in exports for the month of August shown by any port on the Pacific Coast. Imports to this district, too, he says, showed an increase of over 33 per cent.

Canadian Prize: The German fast freighter Weser arrived at Victoria on October 4 under a naval escort, having been captured by a Canadian cruiser off the coast of Mexico. She was taken after she had slipped out of the port of Manzanillo at night without proper clearance papers from port authorities. The Canadians put a prize crew aboard her and sailed her north. She is considered a rich prize, as she is said to be one of the fastest freighters afloat.

The Last Scrapper: Due in Seattle the night of October 9, the Japanese freighter Kuwayama Maru was to have been the last ship to load scrap iron and steel on Puget Sound, a cargo of 7500 tons. The Tosei Maru and the Nanman Maru, due October 16 and 26, will come under the ban and will not be allowed to load scrap. Cuba Maru, which cleared about the 10th, had a full cargo of 10,000 tons of scrap and copper.

Literature of the Industry

Industrial Catalogs of Today Form a Basis for the Engineering Handbooks of Tomorrow

the Model A 4½-inch bore by 5¾-inch stroke and the Model D 5½-inch bore by 7-inch stroke, light-weight, high-speed diesel engines built by the National Supply Company in units ranging from 2-cylinder, 29 bhp. to 8-cylinder, 230 bhp. The book carries many beautiful half tones of yachts and other craft powered with these engines.

These models of the Superior diesel are well adapted to use as prime movers for electric generating sets afloat or ashore, and many such applications testify to their sturdy, long-lived economical service.

Enterprise Diesel Engines for Marine Service, Bulletin No. 171 of the Enterprise Engine Company, San Francisco. This beautiful sixteen-page booklet in green and black on coated paper describes the Enterprise types DMQ, DMG, DMW and DML marine diesel engines with built-in engine-driven auxiliaries and with or without exhaust gas supercharging. These engines range from 50-hp to 1900-hp rated capacity.

All distinctive design features are described and illustrated. Pilot house control is featured. Overall dimensions and weights of both reverse gear and directly-reversible types are charted. A very interesting page is devoted to graphs showing the advantageous performance of Enterprise diesel engines in the higher speed range and with supercharging.

"Truform," a new six-page folder describing this non-shrinkable, oil-hardening alloy steel for use in tools and dies where extreme accuracy is required, has just been issued by the Jessop Steel Co.

The new folder fully describes the physical properties of Truform, which include a low coefficient of expansion, greater hardness, exceptional toughness and good machinability. Also described are the recommended heat-treatment and typical applications. A chart illustrates the tempering range for Truform.

Proportioning Equipment for Corrosive Fluids, a four-page blue and white brochure, Publication 2985 of the Cochrane Corporation.

The Cochrane Air-Actuated Proportioner was designed especially for accu-

(Page 62, please)

of their explosion-proof, splash-proof performance, and because variable speeds from 30 to 6000 rpm are obtainable with them.

Aluminum Pistons and Aluminum Cylinder Heads, a fifty-page profusely illustrated book published by Aluminum Company of America.

There are four chapters, treating respectively the following subjects:

Types of Pistons
Piston Materials
Piston Finishes
Aluminum Cylinder Heads

The text treats its subject in conservative technical fashion, and is illustrated by half tones and line drawings, so that this booklet is a worth-while handbook for engineers and designers.

Marine Engines, Generators, Auxiliaries, Circular No. 40 of The Hill Diesel Engine Company.

A six-page brochure illustrating and describing the Hill Series R diesel engine in the 6- to 43-hp range, and its application in marine propulsion, marine auxiliary generating sets, and the marine auxiliary unit consisting of engine generator, compressor and bilge pump. Applications are illustrated, and complete specifications and operation characteristics are shown in tables and graphs.

How To Choose a Steam Trap, a handsome forty-four-page 8″x11″ booklet published by The V. D. Anderson Company. Profusely illustrated with half tones, diagrams, graphs and tables, this publication contains a great deal of valuable data for the steam engineer. It is claimed that some of the material has never before been published.

Protective Coatings, Bulletin No. 129, The Dampney Company of America. An eight-page illustrated pamphlet describing Apexior coatings for the preservation of metal surfaces and equipment for applying these coatings to internal surfaces of boiler, condenser and heat exchanger tubes.

Superior Diesel Marine Engines, Bulletin No. 457 of the National Supply Company. A thirty-page handsomely illustrated booklet describing in full detail

Working of S. A. E. Nickel Alloy Steels, a sixteen-page reprint from "American Machinist," republished by the International Nickel Company, Inc.

Data compiled from practice of 34 leading fabricators. Covers effects of alloying elements, characteristics and applications, and heat-treatment. Also practical instructions for machining, broaching, drilling, tapping, threading, milling, sawing, grinding, welding and gas cutting.

Lubricating Oil Coolers, an eight-page illustrated brochure published by Condenser Service and Engineering Co.

This leaflet gives condensed specifications and operating characteristics for lubricating oil coolers of the two-pass packed-head type, together with photo engravings of various installations of these heat exchangers.

Walworth Today: The June-July issue of *Walworth Today* describes many interesting installations of Walworth valves and Walseal Silbray fittings on the new United States liner America.

There were four 36-inch steel valves of the motor operation non-rising stem type for the circulating water lines of the main condensers. These valves are the largest ever built in America for merchant steamer service. The bronze disks weighed 1000 lbs. each, and the complete valves 5000 lbs. each.

All the steel valves on the fuel oil system, on the boiler feed system and on the auxiliary steam systems are Walworth.

Walseal Silbray fittings were used on the copper piping of the hot and cold water lines, the heating lines, the refrigerating lines, the smoke detection system and the hydraulic piping for watertight door control.

Twin Weld Hose, a Hewitt Rubber Corporation leaflet, showing by text and illustration the convenience and economy to be gained by the use of their twin hose for oxy-acetylene welding.

Pneumix Agitators, a four-page 8″x 11″ folder published by the Eclipse Air Brush Company, describing and reciting the advantages of its air-motored agitators. These mixers are important because

)-Tex weather decking on tug D. T. Sheridan

Latex Tile Binder

Saves Weight on S. S. America

The trade name Dex-O-Tex covers the use of pure rubber latex as a binder in cold mixes of various aggregates to make resilient, water-tight, self-adherent surface coverings for interior or exterior floors, decks, walls, bulkheads, ceilings or any structural areas needing such protection. It is ready for traffic 8 to 10 hours after application.

This product, widely and favorably known to European ship operators under the trade name of "Aranbee," is manufactured and distributed in the United States by the Crossfield Products Corporation, whose home office and manufacturing plant is at Los Angeles, California, and who maintain an Atlantic Coast factory at Brooklyn, N. Y.

Its first use in the American Merchant Marine was for covering of weather decks on the round-the-world liners when those vessels were reconditioned by the American President Lines in 1938.

The following qualities give Dex-O-Tex unique advantages for use on shipboard:

(1) **Perfect adhesion.** Bonding strength on wood or metal averages 100 lbs. per square inch.

(2) **Light weight.** Average for ⅜-inch thickness of coating is 2.8 pounds per square foot.

(3) **Resilience.** Never cracks or looses bond under working of hull.

(4) **Sound and heat insulation.** Deadens sound and is highly resistant to heat transmission.

(5) **Cold application.** Disagreeable and costly use and transportation of heating equipment is eliminated.

(6) **Waterproof and anti-corrosive.** It makes metal surfaces proof against both chemical and electrolytic corrosion.

On the recently-completed United States Lines' liner America Dex-O-Tex was used in several ways that very aptly illustrate these advantages.

Approximately 35,000 feet of this decking was used as underlay to form a bond between the steel deck and the ceramic floor tile and glazed base tile in such spaces as: toilets and showers; bathrooms; bars; service lockers; barber shops; dispensary; power rooms; and dressing rooms off the swimming pool.

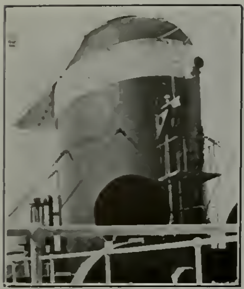
This application illustrates these qualities: (1) The bonding was perfect; (2) in comparison with the usual cement method, Dex-O-Tex saved 15 tons in weight; (3) working of the ship never disturbs the tiles; and (4) no moisture will ever reach the steel.

Dex-O-Tex was used also as a finished decking in the third class staterooms and in the Sea Post Office. This decking, with a mineral aggregate, in an attractive brown shade, has the appearance of linoleum, and forms a seamless, resilient, light-weight deck covering, which adheres to the bare steel without assistance of clips, metal laths or priming coats. Approximately 7000 square feet were used in these rooms.

Perhaps the most novel use of Dex-O-Tex on America was its application to prevent corrosion on the sills of air ports in public rooms and staterooms. Some 550 square feet was applied to these ports in such fashion as to positively eliminate the formation of rust, which makes such an ugly smear on and is so destructive to the interior finish of these rooms.

The L. S. Case Company of San Francisco is licensed applicator of Dex-O-Tex, and has made a number of very successful applications on Pacific Coast vessels.

Terrazo aggregate Dex-O-Tex makes attractive sanitary flooring for this officers' mess room



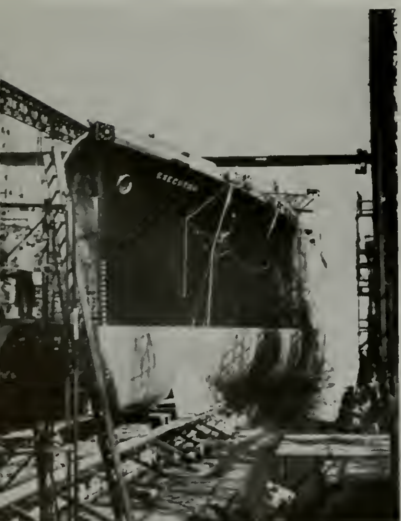
On the Ways — SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Fore River Launches Executor

American Export Lines' extensive new shipbuilding program drew one step closer to realization on September 21, when the S. S. Executor was launched at Fore River Yard, Bethlehem Steel Company, Shipbuilding Division, Quincy, Mass.

This was the seventh vessel of the company-designed "Exporter" type to hit the water since June, 1939. Mrs. Albert R. Winnett of Toronto, daughter of American Export Lines' president, christened the vessel in the presence of a group of 200 company officials and guests, who traveled from New York to Quincy by special train for the ceremony. Among the latter were Admiral Emory S. Land, chairman of the U. S. Maritime Commission, and Mrs. Land.



The Executor is of the shelter deck type, with fireproof construction throughout, and modern, sanitary living and recreation accommodations located in the steel house amidships. Double 'tween decks, seven large hatches, three of which can be double-rigged, electric-driven winches and booms with capacities up to 35 tons, are provided to facilitate loading. The vessel has a steaming radius of 15,000 miles, is designed to operate economically at 16½ knots fully loaded, and has abundant reserve speed.

Principal characteristics of the Executor are:

Length overall	473′ 1″
Molded breadth	66′
Molded depth	42′ 6″
Designed draft, loaded	27′
Speed	16½ knots minimum
Steaming radius	15,000 miles
Boilers	450 lbs. per square inch pressure at 750° F.
Engines	8,000-hp, Bethlehem turbines
Displacement tonnage	14,480

Three holds are fitted with Cargocaire, a system for conditioning certain types of semi-perishable cargo first adopted by American Export Lines in these "Exporter" vessels. There are also deep tanks for handling a large tonnage of fluid cargo. Independent pumps are provided to work such cargo. Two fire protection systems serve each hold.

For recent developments in Southern California shipyards, see leading articles, this issue. For Puget Sound news, see "Northwest Marine Review" section.

Lake Washington Gets Survey Ship

On October 1 the U. S. Coast and Geodetic Survey awarded to the Lake Washington Shipyards of Houghton, Washington, a contract to build a 1500-ton steel hull survey ship, to be named Pathfinder, to take the place of an old survey ship of that name. The Lake Washington yards won this contract under competitive bids. The cost is to be $1,219,000 plus a reserve not to exceed $48,000 to cover increases in labor and/or material costs. Time limit specified is 720 days.

The new Pathfinder, especially designed for Alaska survey duty, will be of the following principal dimensions and power:

Length overall	229′ 4″
Length between perpendiculars	209′ 4″
Breadth, molded	39′
Depth, molded to upper deck	23′ 6″
Draft, mean load	15′
Displacement, light	1,500 tons
Displacement, loaded	1,900 tons
Shaft horsepower	2,000
Speed at 130 rpm	15 knots
Cruising radius	8,000 miles

This ship is of somewhat larger dimensions than the survey ship Explorer, recently delivered to the U. S. Coast and Geodetic Survey by the Lake Washington Shipyards.

Auxiliary Survey Ship Contract

On competitive bidding, apparently limited to Puget Sound boat builders, a contract to build an auxiliary survey vessel for $149,990 was awarded on October 1 to S. E. Sagstad of Seattle, Washington, by the U. S. Coast and Geodetic Survey.

This ship, to be named Patton, is of special design for survey duty in western Alaska, and will be a wooden, twin-screw,

diesel-powered vessel of the following principal dimensions and power:

Length overall	88′
Beam, molded	21′
Draft, mean load	7′ 6″
Displacement, loaded	161 tons
Shaft horsepower	300
Speed, maximum	10 knots
Cruising radius	3,000 miles

Ocean Dominion Contract

The Maritime Commission on September 25 announced an award of a contract for construction of three vessels generally similar to C-2 type with accommodations for 38 passengers, single-screw, steam-propelled cargo vessels for the Ocean Dominion Steamship Corporation to Moore Dry Dock Company, Oakland, California, on an adjusted price basis of $2,850,000 per ship. Bids were received on these ships on September 11, 1940.

The general specifications for the ships are: Length overall 442 feet; beam 62 feet; draft loaded 25 feet; sustained sea speed 17 knots; cargo capacity 353,000 cubic feet, including 7,800 cubic feet of refrigerated space. The vessels are especially designed for the carriage of bauxite for the Aluminum Company of America, and will be operated from North Atlantic and Gulf Ports to the Caribbean.

Seattle-Tacoma Gets Two More C-3s

The United States Maritime Commission announced on October 23 award of contract to the Seattle-Tacoma Shipbuilding Corp., Tacoma, Washington, for construction of two C-3 vessels, which will be converted into Army transports.

Each vessel will be constructed to carry approximately 1125 men and 200 officers. Cost of the vessels, exclusive of the cost of conversion for transport use, will be $2,990,000 each. The contract was awarded on bids received on August 6, 1940.

The award brings to 11 the number of vessels ordered by the Maritime Commission from this Tacoma shipyard. The Commission's designed C-3 vessel is 492 feet overall, operates at 16½ knots, and has a displacement of about 17,000 tons.

Launchings of the Month

Mackerel, a U. S. Navy submarine, launched by the Electric Boat Company on September 28.

Cape Flattery, a C-1 type cargo motorship launched by the Seattle-Tacoma Shipbuilding Corporation at Tacoma, Washington, on the 28th of September.

M. E. Lombardi, a steam-drive tanker for the Standard Oil Company of California, launched by the Sun Shipbuilding & Dry Dock Company on September 28 at their yard, Chester, Pennsylvania, and christened by Mrs. M. E. Lombardi.

Cape May, a C-1 type cargo steamer launched by the Bethlehem Steel Company Shipbuilding Division at its Staten Island Plant on October 1.

Alcoa Pioneer, a C-1 type cargo steamer for the Alcoa S. S. Company, launched by the Bethlehem Steel Company Shipbuilding Division at the San Francisco Works of its Union Plant on October 4.

President Hayes, a C-3 type combined passenger and cargo steamer for the American President Lines, launched by the

Newport News Shipbuilding & Dry Dock Company on October 4.

Loella Lykes, a C-1 type cargo steamer for Lykes Bros., launched by the Federal Shipbuilding & Dry Dock Company at their Kearny, N. J., plant on October 5.

Robin Locksley. Sparrows Point Yard of the Bethlehem Steel Company Shipbuilding Division on October 5 launched the first of six fine geared turbine drive modified C-2 type cargo steamers for the U. S. Maritime Commission and the Robin Line of the Seas Shipping Company. Mrs. Arthur Ramond Lewis, Jr., wife of the president of the Seas Shipping Company, christened the vessel.

American Leader, a C-1 type cargo motorship for the U. S. Maritime Commission and the United States Lines, launched by the Western Pipe & Steel Company of California on October 8 at their South San Francisco yard.

Mormactide, a C-3 type cargo steamer for the U. S. Maritime Commission and the Moore-McCormack Steamship Company, launched by the Ingalls Shipbuilding Corporation on October 12 at their Pascagoula, Mississippi, yard.

Expansion of Turbine Plant

General Electric is spending $11,500,000 in expanding present facilities for manufacturing propulsion equipments for the U. S. Navy, it was recently announced by Charles E. Wilson, president of the company. This is in line with the company's policy of anticipating, insofar as is possible, the requirements of the defense program for regular lines of G-E equipment.

The expansion program involves equipping an existing building at the company's Erie (Pa.) Works with heavy machinery for the manufacture of large steam turbines required by destroyers and light cruisers, and enlarging two of its Lynn (Mass.) shops, where reduction gears for the propulsion equipments are made.

The additional facilities obtained by this expenditure will release available capacity at Schenectady for the manufacture of the larger turbines for battleships, as well as those regularly manufactured for utility customers.

At the present time, General Electric has on order or is building land and marine turbines totaling 6,000,000 horsepower.

Equipping the existing shop at Erie for manufacture of turbines will cost $8,500,000. Delivery of the first units from that point will be made toward the end of 1941.

Fortunately, the shop at Erie is immediately available and is ideally suited for heavy manufacture. Crane facilities are already in, and as soon as the big mills and lathes needed for machining the turbines can be installed, the shop can swing into production.

From 12 to 18 months are required for building and testing the turbines and gears which make up the propulsion equipments for the larger Navy ships.

OCEAN-GOING MERCHANT FLEETS REGISTERED IN THE VARIOUS NATIONS OF THE WORLD

(IRON AND STEEL, STEAM AND MOTOR VESSELS OF 2,000 GROSS TONS AND OVER)
AS OF JANUARY 1, 1940.
(Excludes Vessels on the Great Lakes)

RANK	NATION	TOTAL			COMBINATION		FREIGHTERS		TANKERS	
		No.	Gross Tons	Percent	No.	Gross Tons	No.	Gross Tons	No.	Gross Tons
1	Great Britain	2,529	16,321,064	31.4	324	3,736,685	1,769	9,416,804	436	3,167,575
2	United States	1,296	7,881,844	15.2	141	1,219,878	802	4,072,701	353	2,589,265
3	Japan	873	4,574,047	8.8	128	793,060	698	3,340,500	47	440,487
4	Norway	698	3,947,469	7.6	15	89,478	423	1,797,466	260	2,060,525
5	Germany	579	3,353,782	6.5	104	1,071,781	443	2,025,637	32	256,364
6	Italy	505	2,921,791	5.6	106	984,355	325	1,538,561	74	398,875
7	Netherlands	405	2,453,877	4.7	94	816,651	204	1,093,055	107	544,171
8	France	414	2,383,466	4.6	106	1,038,253	263	1,031,171	45	314,042
9	Greece	334	1,500,700	2.9	2	20,870	326	1,450,854	6	28,976
10	U. S. S. R.	244	923,705	1.8	24	122,043	203	688,651	17	113,011
11	Sweden	185	895,472	1.7	14	104,750	150	607,338	21	183,384
12	Panama	120	775,006	1.5	—	—	56	223,377	64	551,629
13	Denmark	156	693,901	1.3	14	81,500	129	507,031	13	105,370
14	Spain	161	659,095	1.3	16	108,639	132	479,586	13	70,870
15	Yugoslavia	77	339,425	.7	4	23,799	73	315,626	—	—
16	Brazil	75	329,977	.6	24	127,616	50	200,014	1	2,347
17	Belgium	55	320,818	.6	8	75,039	37	175,350	10	70,429
18	Finland	99	316,141	.6	—	—	98	309,592	1	6,549
19	Portugal	31	158,405	.3	9	60,054	21	95,505	1	2,846
20	Latvia	44	150,651	.3	—	—	44	150,651	—	—
21	Argentina	34	148,012	.3	4	12,106	7	22,008	23	113,898
22	Chile	36	133,800	.3	18	84,862	18	48,938	—	—
23	Rumania	23	100,893	.2	10	49,749	10	36,407	3	14,737
24	Turkey	27	96,240	.2	9	40,094	17	52,423	1	3,723
25	Egypt	18	89,992	.2	6	44,795	12	45,197	—	—
26	Honduras	20	75,297	.2	8	33,777	11	33,897	1	7,623
27	Poland	14	73,013	.1	6	52,443	8	20,570	—	—
28	Philippines	12	71,839	.1	—	—	11	66,603	1	5,236
29	China	25	71,032	.1	1	6,021	24	65,011	—	—
30	Venezuela	23	68,583	.1	—	—	—	—	23	68,583
31	Estonia	21	61,704	.1	—	—	21	61,704	—	—
32	Peru	7	25,834	.1	2	9,361	4	13,653	1	2,820
33	Hungary	6	22,748	—	—	—	6	22,748	—	—
34	Bulgaria	6	19,204	—	2	7,659	4	11,545	—	—
35	Mexico	5	16,750	—	2	4,990	1	2,220	2	9,540
36	Uruguay	2	6,932	—	—	—	2	6,932	—	—
37	Palestine	1	3,075	—	—	—	1	3,075	—	—
38	Cuba	1	2,492	—	1	2,492	—	—	—	—
	Total	9,161	51,988,076	100.0	1,202	10,822,800	6,403	30,032,401	1,556	11,132,875

Note: All figures subject to revision.
Courtesy — United States Maritime Commission, Division of Research.

(From "The Bulletin," American Bureau of Shipping)

Fire Protection and Good Housekeeping—*Steward's Department*

Of all emergencies encountered on a ship at sea most likely to upset the morale of the personnel, fire is the one to be most feared, as it strikes with the least warning. Yet, fire is the one hazard that is almost wholly preventable when the crew take the most ordinary precautions. In other words, fire prevention is merely good housekeeping.

When you board a passenger ship, the first impressions are of cleanliness and order—gleaming linoleum, bright woodwork and shining chromium. The housekeepers responsible for this are the stewards, from the chief down to the firemen's mess boy. All of those portions of the vessel which may be termed as "livable" come under their direct supervision and observation. The important and essential function performed by the steward's department in its contribution to the smooth running of the vessel cannot be overestimated. A steward who takes a proper pride in his work, and most of them do, strives to discharge his responsibility to the traveling public with respect to their safety as well as to their comfort. He is fulfilling the requirements of his job just as surely as the seaman in the deck department or the engineman in the engine department. And it may be stated that his regard for the safety of those on board is in direct ratio to the methods of housekeeping he follows.

The steward's department includes not only those portions of the vessel which are visible to passengers, but also those spaces which are given over to lockers, service rooms and cubbyholes, where working equipment and cleaning materials are stored. If curiosity should lead you to open a door marked "Service Room," you would not expect to find on a well-regulated, properly supervised vessel the following conditions: A trash basket in one corner heaped with used paper towels, paper cups, novelty hats and wilted flowers left over from the captain's dinner the night before. You would not expect to see in another corner empty floorwax cans, dirty mops and dusters; dirty clothes, old newspapers, magazines, or a pile of rags saturated with oil and furniture polish thrown there after having been used on the woodwork. The presence of oily rags or rags saturated with wax or unapproved polishes creates a dangerous fire condition. The lack of decent order does not speak well for the discipline of a vessel.

If you visit the galley, you see sparkling glassware and china arranged neatly in racks, clean pots and pans hanging in a row overhead or on a bulkhead—a place for everything and everything in its place. Then you chance to look into the uptake or ventilator over the range. Too often it will be a black-soot-covered greasy hole. If your attention is caught by a pile of hot ashes on the deck in front of the charcoal broiler, or the cord of the hot plate frayed nearly through, exposing the wires, you realize that these may be but a few of the dangerous and unnecessary conditions allowed to go unnoticed by a steward who is either ignorant of or neglects the rules of good housekeeping on a vessel.

To have a fire, two things must be present:

(1) Combustible material
(2) Source of ignition

and they must be brought together.

The National Safety Council have given the matter of fire hazards, prevention and control, considerable study, and the following information, of particular interest to the steward's department, is quoted from their publication, *"Marine Safety."*

I. Fire Hazards

Galley:

(1) Flarebacks in range fire boxes.
(2) Use of kerosene or gasoline to start fires in coal-burning ranges.
(3) Hot ashes.
(4) Collection of oil in drip pans.
(5) Leaky fuel lines.
(6) Use of matches other than "safety" type.
(7) Carbureter bowl not properly cleaned.
(8) Accumulation of trash and other combustible material.
(9) Overheating galley range.
(10) Permitting grease to accumulate on hood over range or in air ducts.

Public Rooms:

(1) Smoking.
(2) Use of polishes or cleaning agents other than approved types.
(3) Accumulations of trash, wastepaper, etc.

Miscellaneous:

(1) Oily rags, or those dirtied by metal polishes, wax or oil cleaners.
(2) Portable extension wiring.
(3) Flammable material in contact with electric lights.
(4) Flammable material in contact with steam pipes.
(5) Portable electric utensils—hot plates, toasters, percolators, etc.
(6) Improper storage of flammable liquids.
(7) Accumulation of trash or wastepaper, etc.

II. Fire Prevention

(1) Smoking—require absolute compliance by officers in order that they may require obedience of crew.

Freighters—No smoking in galley or storerooms.

Passenger vessels—No smoking while on duty; smoking permitted in crew's quarters only. Permit no smoking by passengers while attending motion picture shows.

(2) Permit use only of approved polishes and cleaners by steward's department employees. Destroy all unauthorized types or brands upon discovery.

(3) Constant observance of passenger quarters and public rooms for fire hazards such as cigarette butts, burning matches or electric curling irons.

(4) Permit use of safety matches only.

(5) No flammable material in contact with steam pipes or electric lights.

(6) Flammable liquids stored in approved places.

(7) Keep lockers and closets neat, and permit no accumulation of rubbish.

(8) Do not permit oily, paint-smeared rags, nor those dirtied with polishes, waxes or cleaning material to accumulate in such inclosures as lockers or cupboards.

(9) Permit no extension cords.

(10) Furnish receptacles for wastepaper and trash in crew's quarters, and empty daily.

(11) Furnish metal containers for hot ashes if coal-burning range is used.

(12) Do not use kerosene or gasoline for starting galley fire.

(13) Keep oil burners in proper repair and adjustment.

(14) Issue proper instructions relative to lighting off burners.

(15) Housekeeping—daily inspections of departments of chief steward.

(16) Regular watchmen service at night in public rooms and passenger quarters.

III. Fire Control

Organization:

(1) Frequent regular instruction in methods of fire-fighting.

(2) Frequent regular instruction as to actions upon discovery of fire.

(3) Frequent regular instruction as to location of fire extinguishers and proper use of each type.

(4) Fire drills with assigned definite problems.

(5) Frequent regular inspections of all fire-fighting equipment.

Fire-fighting Equipment:

Type—
- (1) Steam
- (2) Water
- (3) Chemicals
  - (a) Soda acid
  - (b) Foamite
  - (c) Carbon tetrachloride.
  - (d) Carbon dioxide

Location—
- (1) In place
- (2) Easily accessible
- (3) In working order always
- (4) Sprinkler valves open
- (5) Sprinkler heads unobstructed
- (6) Alarms in working order always

Gas Masks and Breathing Apparatus—
- (1) In proper operating condition always
- (2) Men instructed in use and limitations of types carried
- (3) Actual practice in wearing
- (4) Protective clothing.

Representatives of the Bureau make frequent inspection trips, and they are always ready and pleased to assist in the instruction of the crew in the rules for the prevention of fire and in the use of fire-fighting equipment.—*"Bulletin,"* Bureau of Marine Inspection and Navigation.

Clark "Utilitruc" piling cargo on Matson-Oceanic Line docks at Seattle

"Utilitruc" Piles Up The Sacks

A new cargo handling fork truck that is capable of 24-hour continuous service, and with tiering range of 160 inches, or higher if required, has been adopted by many marine terminals at Atlantic, Gulf and Pacific ports, and in the illustration herewith is shown handling cargo on the Matson Oceanic Line docks at Seattle.

Clark "Utilitruc" is made by the Clark Tructractor Division of Clark Equipment Co., Battle Creek, Michigan, in a number of models up to 7,000 pounds capacity. They are gas-powered, operate at 1 to 7 mph. Compactly built, they negotiate crowded dock space easily, maneuver neatly in 'tween-deck space when required, climb ramps under load. Some models are as low as 62 inches. There are straight lift models, tilting models and telescopic models. Center drive enables operator to pick and spot his load accurately.

A Patriotic Insurance Slogan

"Let's Work Together for America" is the slogan now being used by Fireman's Fund Group and carried as a design in its advertising and stationery in response to present need for unity on all national defense plans.

The slogan and design have not been copyrighted, according to officials of the company, and any insurance company or organization is welcome to use it. Combined with the drawing is the seal of the National Board of Fire Underwriters, "Standard Protection." The member companies of this organization recently committed themselves in national advertisements to full cooperation with the Government on national defense measures.

Fireman's Fund reproduced the slogan in the October issue of the company's house organ, *Fireman's Fund Record.*

All Aboard—
For 15th Annual Steamship Dinner!

All aboard for the 15th Annual Steamship Dinner!

Skipper for the 1940 voyage is **Fred L. Doelker,** and the big date is Saturday, November the 9th.

As usual, the scene of the festivities will be the Palace Hotel . . . and anticipating a full crew-list, the committee has engaged the spacious Palm Court.

Purser of the 1940 trip is **Edward H. Harms,** veteran secretary. Committee chairmen are:

Donald Watson, Dinner
K. C. Tripp, Finance
W. C. Empey, Membership
R. S. Norton, Entertainment
Philip A. Coxon, Reception
Eugene Hoffman, Publicity

These annual get-togethers are always memorable events, and fortunate indeed are those who come aboard.

From the well-planned reception, under the capable supervision of Phil Coxon, throughout the sumptuous banquet and a two-hour show, which is always tops in entertainment, thanks to Bob Norton and his first aide-de-camp, Ray Ingram—until the last handclasp up topside, where good fellowship reigns supreme—mighty nigh one thousand members of the steamship and allied industries will rejoice in the handiwork of the capable "officers of the good ship."

American Export Changes

American Export Lines, Inc., announce the appointment of officers to man the S.S. Executor, newest vessel on their fast growing fleet. **Capt. Ernest H. Nelson,** who has been with the line since 1926, will command the Executor with **G. Molestad** as first officer, **L. R. Smith,** second officer, and **F. Telcher,** third officer. Other appointments include **E. Borg** as first assistant, **J. Fenton,** second assistant, and **H. W. Dailey,** third assistant.

The engineering staff will be led by W. E. Griffiths as first engineer who has been with the company for seventeen years. Mr. Griffiths held a rank of second assistant engineer when he joined the company and was appointed to his present grade in 1930.

COMMITTEES

DINNER—Donald Watson, *Chairman,* Interocean Steamship Corporation; Jos. A. Moore, Jr., *Vice-Chairman,* Moore Drydock Company; W. E. Dooling, American-Hawaiian Steamship Company; L. P. Bailey, Balfour-Guthrie Company; Captain Walter Gay, Bank Line; Cyril Meek, Bay Cities Transportation Company; A. K. Hulme, General Steamship Corporation; Chas. Haseltine, Pacific Stevedoring & Ballast Company; J. J. Coney, Hillcone Steamship Company; Dearborn Clark, American-Hawaiian Steamship Company; F. H. Fox, General Engineering & Drydock Company.

FINANCE—K. C. Tripp, *Chairman,* Moore-McCormack Lines; R. K. Hunter, *Vice-Chairman,* Luckenbach Steamship Company; L. C. Stewart, Sudden & Christenson; J. C. Van Meurs, Blue Star Line; J. J. Walsh, Furness Line; H. H. Pierson, De La Rama Steamship Lines; E. F. R. DeLanoy, Holland-American Line; T. C. Greene, Norton, Lilly & Co.; Harry Ewing, Luckenbach Steamship Company.

MEMBERSHIP—W. C. Empey, *Chairman,* The Guide; Geo. A. Armes, *Vice-Chairman,* General Engineering & Drydock Company; Harry Thompson, Grace Line; Geo. J. Yater, Pacific Coast European Conference; P. M. Holway, Holway Steamship Company; M. F. Cropley, Matson Navigation Company; W. E. Usher, Calmar Line; A. S. Gunn, Bethlehem Shipbuilding Corporation; Charles L. Wheeler, McCormick Steamship Company; H. H. Brann, Haviside Company; Chr. Jensen, East Asiatic Company; Gilbert Macqueron, French Line.

ENTERTAINMENT—R. S. Norton, *Chairman,* Sudden & Christenson; Ray Ingram, *Vice-Chairman,* Union Oil Company; H. E. Hornung, N. Y. K. Line; T. E. Cuffe, American President Lines; Ray Windquist, General Steamship Corporation; R. F. Burley, McCormick Steamship Company; F. W. Kutter, Fred Olsen Line; W. R. Chamberlin, W. R. Chamberlin Company; Chr. Blom, Klaveness Line; R. A. McLaren, Williams-Dimond Company; Harry Lilly, Norton, Lilly & Co.

RECEPTION—Philip A. Coxon, *Chairman,* Moore Drydock Company; John E. Cushing, *Vice-Chairman,* American-Hawaiian Steamship Company; E. Wright, Kerr Steamship Company; Norvin Fay, The River Lines; A. B. Johnson, Jr., A. B. Johnson Company; Erik Krag, Interocean Steamship Corporation; J. A. Lunny, McCormick Steamship Company; George K. Nichols, Matson Navigation Company; Cornelius Winkler, Transpacific Transportation Company; J. A. McEachern, Standard Oil Company; R. C. Robinson, Hammond Shipping Company; K. H. Donavin, Moore-McCormack Lines.

PUBLICITY—Gene Hoffman, *Chairman,* American President Lines; Ben Foster, *Vice-Chairman,* Western Transportation; Lewis Lapham, American-Hawaiian Steamship Company; Kenneth Cross, Alaska Steamship Company; Gen. Martin, Pacific Shipper; Wm. McKee, Shipping Register; Seamus O'Hanrahan, Commercial News.

HONORARY OPERATING COMMITTEE—*Past General Chairmen:* Harry Scott, General Steamship Corporation; John C. Rohlfs, Standard Oil Company; Hugh Gallagher, Matson Navigation Company; Thomas Crowley, Shipowners & Merchants Tugboat Company; Harry Evans, E. C. Evans & Sons; M. J. Buckley, American President Lines; R. W. Bybee, Moore-McCormack Lines; Roger Lapham, American-Hawaiian Steamship Company; C. H. Chandler, Sudden & Christenson; R. W. Myers, Shipowners Association of the Pacific Coast; Frazier A. Bailey, Matson Navigation Company.

FRED L. DOELKER
General Chairman
GRACE LINE

EDWARD H. HARMS
Secretary
MCCORMICK STEAMSHIP COMPANY

PACIFIC MARINE

Reviews

On To New Orleans

by Thomas A. Scott

National President of The Propeller Club of the United States

Each year, the convention of The Propeller Club of the United States brings together representatives of every branch of marine activity in this country—deep sea, inland waterway and Great Lakes—vessel operators, builders and repairers, designers, manufacturers and dealers in marine equipment of every conceivable character. And each year, the size and importance of this gathering grows, for as the organization itself constantly expands, attendance at the sessions increases in proportion, while the tremendous activity in shipbuilding and the dependence of our shippers upon American vessels due to the war have served to focus public interest upon the American Merchant Marine, both as a tremendous factor in the national defense and as a means of maintaining delivery service for our exports, imports and domestic commerce.

This year's meeting—the Fourteenth Annual Convention of The Propeller Club of the United States—will be held in New Orleans December 8th to 11th inclusive, where the vast waterborne commerce of the Mississippi Valley meets the shipping of the Gulf and the seven seas. The Propeller Club, Port of New Orleans, Port No. 3 in the national organization, will act as host to the convention, and New Orleans committees are hard at work preparing for the accommodation and entertainment of the delegates, their wives and guests who will converge upon their city for the serious business of the convention and the diversions to be found in America's most romantic community which, after more than a century and a quarter, still preserves its "Old World" charm.

In addition to the convention sessions, the important American Merchant Marine Conference will again be held for the presentation and discussion of problems affecting the American marine industry. The conference, to which the entire day of Tuesday, December 10th, will be devoted, is strongly endorsed by the Maritime Commission, by government officials and leaders in American shipping affairs in all parts of the country. The program will include outstanding individuals in government and industry who will present their views and invite discussion on a wide variety of subjects of vital interest to the progress of the American Merchant Marine. It is safe to say that the Merchant Marine Conference takes on a greater significance this year than ever before. Present world conditions and the rapid shifts on the world economic front, as well as domestic problems relating to water transportation, have created a constantly changing situation affecting every factor in marine affairs.

Another important part of the convention will be the Marine Exhibition in which shipbuilders, steamship companies, marine equipment manufacturers and others will display their services and wares. The exhibition will provide a means for the vessel operator to become acquainted with the latest developments in marine engineering and apparatus and, at the same time, tell the world about his own facilities for the transportation of cargo and the accommodation of passengers.

The Roosevelt Hotel in New Orleans has been designated as official headquarters of the convention, and all business sessions, as well as the Marine Exhibition, will be held there.

More McCormack Personnel Changes

Commander K. H. Donavin, assistant to the president, reports that Comm. Herman S. Mayo, port captain of Moore-McCormack Lines, returned to sea after two years' absence when he sailed on October 18 in command of the American Republics liner Uruguay, replacing for one voyage Captain William B. Oakley, regular master of the ship. Captain Oakley is ashore for a vacation, and plans to spend six weeks in Florida.

Captain Mayo is a veteran of the Moore - McCormack Lines staff. He started his nautical career in 1915, when he graduated from the Massachusetts Nautical School. He then became quartermaster for the American Hawaiian Line, and was a second mate at the outbreak of the World War. He served in the Navy as a navigating officer, and in 1921 joined the staff of Moore-McCormack Lines as third mate. He rose successively through the various posts to the position of master, and for six years was master of the liner Scanpenn, operated by Moore-McCormack Lines in its American Scantic Line service to Scandinavia. Captain Mayo is a lieutenant commander in the Naval Reserve.

Pacific Coast interests remember the Uruguay as the former California, operated in the intercoastal service of the Panama Pacific Line.

"The Mariners" Launch Fall Programs

The Mariners' Club of California, back with the "full-speed-ahead" signal after the summer vacationing, has been responsible for several lively get-togethers and important events during the September-October period.

Early in September, the Board of Governors trimmed ship for the fall voyage, mustering all committees and laying out blue prints and charts for programs out ahead.

On October 3 the organization of maritimers held a very successful luncheon-meeting aboard the after deck of the good ship "St. Julien" (moored at 140 Battery Street), with **F. J. Marias** as guest speaker. Mr. Marias, chairman of the State Board of Harbor Commissioners, addressed the Mariners on "Harbor Responsibilities During an Emergency." Speaker Marias brought to his discussion the background of his personal experience in World War No. I, and his talk proved particularly timely and informative.

Walter J. Walsh, president of the Mariners' Club, introduced our speaker, and also outlined to the membership the plans under way for important events, which will soon be announced.

The next luncheon program was observed in conjunction with other sponsoring organizations, primarily the Navy League of the United States. The event . . . our annual Navy Day Program, was held at the Fairmont Hotel on Thursday, October 24. Present were leaders in Navy and merchant marine affairs from all Northern California districts. Key speaker was **Hon. Frank R. Devlin,** on the timely subject, "Our Navy."

Chairman of the Day was **Walter J. Walsh. Stanley E. Allen,** secretary-treasurer of the Mariners, reports: "We have many new members coming into the fold. Our club, bigger and better than ever, is all set for a banner year!"

Xzit Extends Service To Alaska

Busier than the proverbial switch engine during his October visit to San Francisco was **W. H. "Bill" Rudy,** Pacific Coast manager for Xzit Sales Company.

Owing to the materially expanded business which his company is enjoying in the Bay area, Bill has completed arrangements for additional man power in this district for the three distinctive lines which these manufacturers offer the marine and industrial trades.

"We have also added to our list of district agents a new selling connection up in Juneau—Elmer Fern of 227 South Franklin Street, who will take care of our customers throughout the Alaskan district. This appointment now rounds out our Pacific Coast service up and down the entire seaboard, and makes it possible for our marine friends to replenish their supplies of Xzit in all principal maritime localities.

"In a few short years, our product of Xzit—fire scale and soot eradicator—has gained tremendously in favor with Coast ship operating lines. We are now numbering among our customers some of the biggest tanker and merchant fleet operators in the Pacific area. We feel that our strengthened service is justified by this fine acceptance of our product, and along with our newly-established Alaska contact we have coverage in the Puget Sound, Portland, San Francisco Bay, Los Angeles-Wilmington and Honolulu zones."

Rudy, a visitor to the P. M. R. offices a day or so ago, read us excerpts from a report issued by the Xzit president, **J. F. Govan,** out of Hoboken headquarters, to the effect that Eastern and Gulf Coast business is steadily climbing on the upward curve.

Precision Bearings, Inc., of Los Angeles have recently completed extensive remodeling of their main office and factory. In addition to the remodeling and renovating, new equipment has been added and personnel changes have been made to facilitate handling of orders at the P B I headquarters.

Exhibit

An unusual marine exhibit is now being displayed on the ground floor of the Merchants Exchange Building, 465 California Street, and is open to the public daily, except Sundays and holidays, from 10 A.M. to 3:30 P.M. and on Saturdays from 10 A.M. until noon. It will remain on display throughout October and November, in space donated by the Merchants Exchange Building, under the joint sponsorship of the San Francisco Junior Chamber of Commerce and the Marine Exchange of San Francisco.

The Marine Exhibit includes many valuable and interesting collector's items, as well as ship models and old prints. Noteworthy are a beautiful model of the Queen Mary, recently built in San Francisco, models of the sailing ships Kenilworth and Tillie E. Starbuck under full sail, original clipper ship bills of lading, the only copy of the first issue of the "Guide," 1865, old prints of early Pacific Mail liners, and other documents and pictures relating to our maritime history.

The committee responsible for collecting and arranging the exhibit including the securing of funds necessary to cover the cost involved are: Edward S. Clark, chairman; Mrs. Alma Spreckels Awl; William A. Baxter, secretary; Jerome Landfield; Roger D. Lapham; John N. Rosekrans and Mrs. Edgar Walter.

"San Francisco's principal industry is its maritime commerce. This exhibit is designed to draw attention to this industry, the importance of which is sometimes lost sight of by the general public. Our hope is that this exhibit will serve as the nucleus of something that will be of lasting value to the entire Pacific Coast—a Maritime Museum," Mrs. Alma Spreckels Awl stated.

Wall Rope Appointment

Warren Taylor, Pacific Coast manager of the Wall Rope Works, announces the appointment of the Atlas Marine Supply Company, 264 Seventh Street, San Pedro, California, as Wall Rope distributors in that territory.

The Atlas Marine Supply Company is an old established supply firm in the marine field. Officials of the company are **Sigmund Baardsen** and **Gunnar Sconhoft.**

Propeller Club Hears Comm. Robert C. Lee

The Port of San Francisco

Charles L. Wheeler
President
John E. Cushing
First Vice-President
Arthur B. Poole
Second Vice-President
Hugh Gallagher
Third Vice-President
Eugene F. Hoffman
Secretary-Treasurer

BOARD OF GOVERNORS

Frazer A. Bailey
Capt. Henry Blackstone
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Fred L. Doelker
Hugh Gallagher
A. S. Gunn
Edward S. Harms
George Jordan
Roger D. Lapham
Marshall Levis
Ira S. Lillick
Capt. Lewis Mesherry
Joseph A. Moore
Arthur B. Poole
Charles L. Wheeler

Newly-elected president **Charles L. Wheeler** has launched his administration most impressively with the opening luncheon program, bringing out a capacity attendance that comfortably filled the Comstock Room in the Palace Hotel on Friday, October 25.

Club members responded enthusiastically to hear **Comm. Robert C. Lee,** executive vice-president of Moore-McCormack Lines—out here from New York headquarters for a busy five-day session with Coast officials.

Commander Lee addressed his audience in a straightforward and informal manner, bringing home to his listeners his alert viewpoint on pertinent ship operating problems. His talk more than made good on the heralded proclamation which quoted **Hugh Gallagher,** who heard Comm. Lee recently back in New York.

The speaker, president of the Propeller Club, Port of New York, took the occasion to review the accomplishments of the national organization, emphasizing the advantages of working with the combined strength of other Ports in the solution of our local difficulties.

Statement of Ownership

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of PACIFIC MARINE REVIEW, published monthly at San Francisco, California, for October 1, 1940.

State of California, County of San Francisco, ss.

Before me, Edith Goewey, a Notary Public, in and for the State and county aforesaid, personally appeared BERNARD N. DeROCHIE, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the PACIFIC MARINE REVIEW and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, JAMES S. HINES, 500 Sansome Street, San Francisco, Calif.
Editor, ALEX J. DICKIE, 1035 Mariposa Avenue, Berkeley, Calif.
Managing Editor, — .
Business Manager, BERNARD N. DeROCHIE, 500 Sansome Street, San Francisco, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

JAMES S. HINES, owner.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is .... (This information is required from daily publications only.)

(Signed) BERNARD N. DeROCHIE,
Business Manager.

Sworn to and subscribed before me this 20th day of September, 1940.

EDITH GOEWEY,
(SEAL) Notary Public in and for the City and County of San Francisco, State of California.

(My commission expires November 22, 1940.)

Max Rotter Answers Last Call

A Tribute by Edward B. Pollister

Max Rotter passed away on October 6, 1940, at St. Louis, Mo., at the age of 73. Death was due to a sudden acute attack of heart trouble.

His engineering career began in England in 1883, where for eight years his training specialized in power machinery, steam engines and hydraulic machinery, including three years with Maxim Nordenfelt Co. (Hiram S. Maxim) of experimental work, including steam power plant for Maxim's airplane.

He came to the United States in 1892, beginning work with the Walker Manufacturing Co. of Cleveland, Ohio, going to Fraser & Chalmers, Chicago, Illinois, as mechanical engineer in 1894 and after merger in 1902 became special engineer to the board of directors of the Allis-Chalmers Company. His duties included investigating heavy machinery developments in Europe, embracing Parsons steam turbines, large blast furnace gas engines, high speed steam engines and diesel engines.

He was transferred in 1904 to the Milwaukee office of the Allis-Chalmers Company, first as engineer in charge of steam turbines and gas engines, and later became chief engineer of this department.

In 1912 he accepted a position with the Busch-Sulzer Bros.-Diesel Engine Company as chief engineer and later served for many years as vice-president in charge of engineering, supervising development of stationary, marine and submarine type diesel engines.

During the last World War under Mr. Rotter's direction, four sizes of original Busch-Sulzer design of submarine engines ranging from 300 to 2500 hp were successfully developed.

Due to his 28 years of uninterrupted diesel engine experience, Mr. Rotter had long been known as the dean of American diesel engineering. He had faithfully worked on a number of committees for the American Society of Mechanical Engineers, of which he had been a member since 1899.

He was beloved by all who knew him.

Literature of the Industry

(Continued from Page 50)

rately feeding sulphuric acid in conditioning boiler feed water. A contact meter in series with a cycle controller operates an air compressor inside the proportioner shell when a predetermined flow is reached. The acid is measured into the dilution tank, to which dilution water is proportioned by a simple but accurate mechanism that prevents abnormal chemical concentration, either too high or too low, usually associated with batch feeding. A special feed-line fitting provides for proper introduction of diluted acid or other fluid into the main flow.

A complete illustrated description of the design and operation of this system appears in this publication. Line drawings, installation photographs and operating curves serve to clarify its many advantages in proportioning corrosive fluids.

Clamshell Buckets, Catalog No. 1757 of the Blaw-Knox Company.

Culminating a three-year program of bucket redesign and standardization, Blaw-Knox Company, Pittsburgh, Pa., has prepared a comprehensive thirty-six-page catalog on its series of two-line lever arm clamshell buckets. A total of 242 individual bucket specifications are involved, ranging from ⅓ to 7½ cubic yards. These have been planned with a systematic relationship between units, according to service, and the complete series accommodates operating conditions in a wide field of service. As a result of the program, the company reports savings in engineering and manufacture, together with better value and service to bucket users. Moreover, the problem of selecting the best-performing and most economical bucket for a given job is thus simplified.

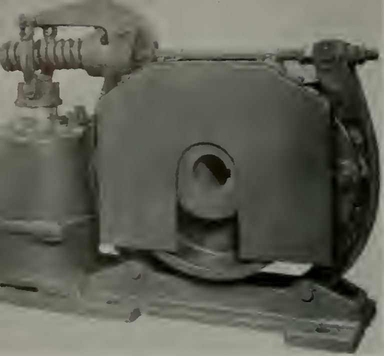
A consolidated table records the service classification of each bucket, lists dimensions and physical data, and gives, in many instances, the approximate cubic feet performance on different classes of material. Another feature of the booklet is a convenient summary of the popular sizes in seven types of lever arm buckets; rehandling, wide rehandling barge type, general purpose, hard digging, round nose hard digging, square nose dredging and round nose dredging buckets. There are service illustrations of each type in the new designs. The summaries list pertinent bucket details and dimensions, and also reveal the general performance, in cubic of payload, which may be expected on different classes of material.

V-Belt Data Book, a 170-page book published by The B. F. Goodrich Company.

The book gives alphabetical listings of belt requirements for electric refrigerators, washing machines, water pumps, beer pumps, stokers and oil burners, gasoline pumps, wood-working machines, air compressors, power lawn mowers, buffing machines, floor sanding machines, garage and shop equipment, milking machines and slicing machines.

These listings give the manufacturer's part number, the Goodrich belt number and its size in each case, and occupy 118 pages.

In addition, 24 pages are devoted to numerical group listings of belt sizes, and eight pages to a numerical list of belt dimensions, both for V and flat belts. Thirteen pages are given to conversion listings.



Magnetic Brakes For Marine Service

To meet the need for a magnetic brake capable of withstanding salt water action in marine service, the Westinghouse Electric & Manufacturing Company has announced an addition to its line of standard industrial d-c magnetic brakes. The new brake is known as the type DW Marine Brake, and is available for operation on 115 and 230 volt d.c., with continuous duty torque ranges from 15 to 1350 poundfeet.

These brakes are designed primarily to be applied to motor shaft extensions, although they may be used where there is no motor. Shunt coils are standard, and a low voltage coil and a series resistor are used to obtain fast operation. A discharge resistor is standard equipment.

Mechanical construction embodies metals that are resistant to salt water corrosive action. Heavy duty parts are used throughout, and metal shields cover the brake wheel and house the operating coil. Watertight enclosures for the entire brake are also available.

Although designed primarily for marine service, this brake may be used in other applications when a watertight brake is required.

Bardco automatic emergency generator

Automatic Emergency Generating Plants

Expansion of the production facilities of the Bardco Manufacturing and Sales Co., builders of automatic emergency stand-by generating plants, was recently announced by Fred Jervis, president of the firm. For the past five years their activities have been confined to the Pacific Coast, but the growing demand in the Mid-West and East for the type of emergency stand-by electric generating plants built by their firm resulted in the establishment of a large plant at Dayton, Ohio, adjoining the Master Electric Company. Their Los Angeles headquarters will be maintained, but their production and engineering organization will be concentrated at Dayton.

The line of Bardco emergency stand-by generating plants has been broadened to include full automatic plants with capacities from 1 kw to 200 kw, as well as a complete line of constant-duty generating plants. They will be designated as the Bardco "Master" series. Most popular units have been in the 25- to 50-kw sizes, but addition of the smaller units to their line permits their entering many new fields of application. Among some of the well-known firms that use Bardco stand-by plants are such motion picture producers as Warner Bros., Paramount Studios, Walt Disney, Columbia Pictures and 20th Century Fox. At each of these studios there are installed Bardco plants which automatically take over the load when normal power is interrupted. Only three seconds elapse between power failure and the time that the Bardco plants are carrying the load.

Features of the Bardco stand-by plants include three-second "on the line" starting, a special voltage regulator developed by Bardco engineers, extreme compactness of the plants, automatic transfer and starting switches, special safety controls and alarms developed expressly for automatic plants.

Synthetic Tubing For Hard Services

A special line of hose, or "tubing," for specialized, rigorous service where rubber has been found not thoroughly suitable is now being made from Koroseal, its synthetic elastic material with rubber-like qualities, by The B. F. Goodrich Company. Koroseal is plasticized polyvinyl chloride, whose basic materials are coke, limestone and salt.

The new Koroseal hose is made without fabric or any other wall reinforcement, being stocked in inside diameters ranging from $\frac{1}{8}$-inch to $\frac{1}{2}$-inch and $\frac{1}{16}$- to $\frac{1}{8}$-inch wall thickness, and can be made at present in all sizes up to 3-inch outside diameters.

The hose shows durometer hardness 70 to 78 at 85 degrees Fahrenheit; specific gravity, 1/31; working pressure, 50 pounds at temperatures up to 120 degrees Fahrenheit. It is made in dull black. Recommended working pressure of 50 pounds per square inch is based on a safety factor of 5.

Permitting no loss of vacuum through diffusion, the hose withstands vacuum better than equivalent wall thickness of rubber hose. It is absolutely free from sulphur, and can be attached to such metals as brass or silver without corrosion of the metal. It does not swell in oil or other solvents of rubber, is not affected by strong corrosives, is practically impermeable to gas diffusion and does not absorb moisture.

Practically free from deterioration due to aging, ozone or other oxidation, including such strong oxidizing agents as potassium permanganate, chromic acid, hydrogen peroxide, sodium perborate, the hose should not be used in contact with food products, and softens in temperatures above 150 degrees Fahrenheit.

A New Insulation

A new 1500-degree insulating material called L-W Superex has recently been introduced by Johns-Manville. Furnished in both block and pipe covering form, this new material was developed by the J-M Research Laboratories, and represents a marked improvement in conductivity and strength for an insulation in the service temperature range above 600 deg. F.

L-W Superex is offered for use generally in stationary and marine power plant equipment and piping, the blocks being suitable for use in industrial furnaces, ovens, kilns, roasters, regenerators, high-temperature mains, flues and stacks, where the insulation will be subjected to temperatures between 600 and 1500 deg. F.

This new insulation is of the molded diatomaceous silica type, but it is exceptionally light in weight for a high-temperature material, weighing only 20 lb. per cu. ft. The blocks are furnished 3″, 6″, 9″ and 12″ wide in standard lengths of 18″ and 36″, and in thicknesses from 1″ to 4″. Curved blocks are also available. The pipe insulation is supplied, to fit standard pipe sizes, in sections or segments 3 ft. long and up to $2\frac{1}{2}$″ thick.

Wear-Resistant Ball Joints for Dredge Lines

Present-day hydraulic dredging operations, as carried out in the United States, require the most modern practice, and demand of materials the utmost in performance and serviceability. This is true not only of the large-capacity pumps which draw up the material from a harbor or river bed and discharge it through long lines of piping to a bank often at a remote point, but also of the various joints located at frequent intervals along these pipe lines.

Kinmont Manufacturing Company of Los Angeles, manufacturers of heavy machinery, recognized some years ago that there was a field for a superior type of "ball joint" for use on such dredge discharge lines—one that was not only designed to withstand present-day high pump pressures, but would give better wearing qualities against the highly abrasive action of sharp sands.

The Kinmont patented ball joint, now in production about two years, combines the qualities of strength and abrasion-resistance in its cast nickel-chromium-molybdenum steel socket with a sound engineering design that results in a decrease in time of engaging and disengaging the joint. Diameters of both ball and socket are large, so as to increase the angle of swing to a full 20°.

Composition, heat-treatment and properties of the cast alloy steel sockets, all castings for which to date have been furnished by Columbia Steel Company's Torrance, California, foundry, are:

Composition:

Carbon	0.40/0.50%
Manganese	0.60/0.90%
Silicon	0.25/0.40%
Nickel	1.75/2.25%
Chromium	0.60/0.90%
Molybdenum	0.25/0.35%

Heat-Treatment:

1725/1800° F.	1 hr., air-cooled
1500/1550° F.	1 hr., air-cooled
1150/1250° F.	1 hr., furnace-cooled

The inside wearing surface of the socket is flame-hardened to 550 Brinell, minimum, with 3/8" minimum penetration.

Specified Mechanical Properties:

Tensile Strength	105/135,000 p.s.i.
Yield Point	75/100,000 p.s.i.
Elongation in 2"	18/12%
Reduction of Area	40/25%
Brinell (BHN)	225/275

These ball joints are available in sizes ranging from 10" to 36" pipe size. Sixty of the 27" size have been furnished for use on dredge discharge lines of the Standard Dredging Corporation for dredging the harbor of Honolulu, Hawaii, and sixty more are being furnished the same contractor on the San Diego dredging job. The 27" joint has a ball diameter of 38", extreme socket diameter of 48"; and the entire assembly weighs 3200 lbs.

Two Kinmont joints at dredge discharge connector secure great flexibility

A 27" ball joint of Ni-Cr-Mo steel

Light-Weight Sound-Level Meter

A new portable sound-level meter, lighter and more compact than any previous instrument of this kind, has been built by the staff of General Electric general engineering laboratory at Schenectady. It weighs only 19 pounds, but has a range of 24 to 120 decibels, or roughly from the rustle of leaves to the scream of a factory whistle.

The new meter may be used quickly and conveniently for almost any kind of noise study, including airplane engine, cabin and propeller noises; traffic noise; sound in theaters, auditoriums and radio studios; and noises of motors, fans, generators, turbines, pumps, bearings, gears, cylinders and other parts of machinery.

Essential parts of the device are a microphone, an amplifier and an indicating instrument. An arm extension protects the microphone from sound reflected from the case. The amplifier consists of five stages which are resistance coupled.

A switch permits the selection of one of three ear-weighting networks, 40 decibels, 70 decibels or flat frequency response, giving the instrument a response similar to that of the human ear. In field use, the instrument is calibrated by applying a precision mouth-blown calibrating unit to the microphone. After adjustment a single knob controls the instrument.

It is designed to perform in accordance with the recently adopted American Standards Association standards for sound level meters. The complete instrument, including the microphone and mounting arm, calibrating unit and batteries, is contained in a carrying case 12¾ inches long, 7¾ inches wide and 9¼ inches high.

The instrument should be useful to automobile manufacturers, appliance makers, consulting engineers, shipbuilders, developmental laboratory workers and others who recognize the relationship of increased efficiency to noise reduction. It should be particularly valuable where a great many measurements are required in a short time.

A vibration velocity unit may be substituted for the microphone on the instrument, thus providing a means of measuring vibration as well as noise.

PROGRESS IN *American Shipyards*

Pacific Coast

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco, Calif.

New Construction:

Hulls Nos. 5360-5364, five C-1 cargo vessels for U. S. Maritime Commission. 395' x 60' x 37'6"; 6400 gross tons each; 4000 hp. Full scantling steam propulsion type. Keels laid, No. 5362, August 8, 1940; No. 5363, October 9, 1940. **Launching dates,** No. 5360, August 6, 1940; **No. 5361, October 4, 1940.**

Twenty destroyers for U. S. Navy.

Four cruisers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
San Pedro, Calif.

New Construction:

Six destroyers for U. S. Navy.

COMMERCIAL IRON WORKS
Portland, Ore.

New Construction:

Four anti-submarine net tenders.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

New Construction:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. Launching dates, No. 156, November 14, 1940; February 19, April 28 and July 24, 1941; delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

New Construction:

Gayle, 44-foot standardized sloop, "Island Clipper" class. Launched July 13, 1940.

Javelin, 44-foot standardized sloop, "Island Clipper" class. Launched August 6, 1940.

Ripple, 55-foot ketch-rig yacht. Launched August 29, 1940.

GENERAL ENGINEERING & DRY DOCK CO.
Alameda, Calif.

Drydock and Routine Repairs:

Ryder Hanify, Aurora, Barbara C., Vindicator, Tahoe, Standard No. 1, Svea, Delarof, Derrick Barge No. 2, Haviside Barge No. 2, Standard Oil Barges Nos. 11 and 17, Dispatch No. 6, Hoquiam.

HARBOR BOAT BUILDING CO.
Terminal Island, Calif.

New Construction:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners. Length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 hp; 10 knots speed; cost $160,000. **Launched October 6, 1940;** delivery date December 1, 1940.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

New Construction:

Order placed for construction of four anti-submarine net tenders.

MARE ISLAND NAVY YARD
Mare Island, Calif.

New Construction:

SS203, Tuna, submarine. Launched October 2, 1940.

SS211, Gudgeon, submarine. Keel laid November 22, 1939.

AS11, Fulton, submarine tender. Keel laid July 19, 1939.

YO44 and YO45, two fuel barges. Launching date, No. YO44, September 17, 1940.

YSD14, seaplane wrecking derrick. Keel laid July 17, 1940.

AS12, Sperry, submarine tender. Order placed June 12, 1940.

Silversides (SS236), Trigger (SS237), Wahoo (SS238) and Whale (SS239); four submarines. Order placed June 28, 1940.

SS281 and SS282, two submarines. Order placed September 9, 1940.

AS15 and AS16, two submarine tenders. Order placed October 3, 1940.

MOORE DRY DOCK CO.
Oakland, Calif.

New Construction:

Hull No. 196, Mormacstar, cargo vessel for U. S. Maritime Commission. LOA 492'0", LBP 465', breadth molded 69'6", depth molded 42'6"; shp normal 8500, shp max. 9350; dis. 17,600 tons; deadweight 11,926 tons; steam turbine propelled. Estimated delivery date December 15, 1940.

Hulls Nos. 197, Mormacsea, and 198, Mormacsun; two C-3 vessels for U. S. Maritime Commission. LOA 492'0", LBP 465', breadth molded 69'6", depth molded 42'6". Estimated delivery dates January 23 and March 24, 1941.

Hull No. 199, caisson gate for Drydock No. 2, Pearl Harbor, Bureau of Yards and Docks. 150' long, 22' beam, 57' high. Keel laid August 12, 1940.

Hulls Nos. 201-203, three cargo and passenger vessels for Alcoa Steamship Co. 442' x 62' x 25'; depth molded to bridge deck 41'6"; 8500 hp; 17 knots speed; passenger carrying capacity 38. Estimated keel laying dates February 3, June 16 and September 10, 1941. Estimated delivery dates January 1, March 15 and June 1, 1942.

OLSON & SUNDE MARINE WORKS
Seattle, Wash.

New Construction:

Two twin-screw speed mackerel fishing vessels. 40' x 10' x 6'; 10 tons capacity.

Boat powered with two 80-hp converted Buick engines. Estimated speed 25 mph.

Boat powered with two 80-hp converted Packard engines. Estimated speed 25 mph.

PACIFIC DRY DOCK & REPAIR CO.
Oakland, Calif.

New Construction:

One all-welded steel oil barge. 148' x 38' x 9'; 300,000 gal. capacity.

THE PUGET SOUND NAVY YARD
Bremerton, Wash.

New Construction:

DD436, Monssen, destroyer. Launched May 16, 1940.

YT139, Ala. Launched November 6, 1939.

AVP10, Barnegat, seaplane tender. Keel laid October 27, 1939.

AVP11, Biscayne, seaplane tender. Keel laid October 27, 1939.

AVP10, Casco, seaplane tender. Keel laid May 30, 1940.

AVP13, Mackinac, seaplane tender. Keel laid May 30, 1940.

YSD15, seaplane wrecking derrick. Keel laid September 10, 1940.

Ships authorized: DD480, Halford; DD481, Leutze; DD592-DD597, eight destroyers; YSD18, YSD24, YSD26, four seaplane wrecking derricks.

SEATTLE-TACOMA SHIPBUILDING CORP.
Seattle, Wash.

TACOMA PLANT

New Construction:

Hulls Nos. 1-5, five C-1 cargo vessels for U. S. Maritime Commission. Single screw, full scantling diesel propulsion type. Two General-M.A.N. 2100-hp engines; 14 knots speed. Keel laying dates, No. 4, October 5, 1940; No. 5, February 10, 1941. **Launching dates, No. 3, November 30, 1940;** No. 4, February 1, 1941; No. 5, May 1, 1941. Delivery dates, No. 1, January 1, 1941; No. 2, February 1, 1941; No. 3, June 1, 1941; No. 4, July 1, 1941; No. 5, October 1, 1941.

Hulls Nos. 6-9, four C-3 cargo ships for U. S. Maritime Commission. 465' x 69'6" x 33'; 8900 tons; 8500-hp steam turbine propulsion; cost $2,990,000.

Hulls Nos. 10-11, two C-3 shelter deck type cargo steamers for U. S. Maritime Commission. To be converted on completion to U. S. Navy troop ships.

SEATTLE PLANT

New Construction:

Twenty destroyers for U. S. Navy.

WESTERN BOAT BUILDING CO., INC.
Tacoma, Wash.

New Construction:

Hull No. 144, purse seine fishing boat. 95' x 24'; for stock. Keel laid September 10, 1940.

Hull No. 145, fishing boat. 115' x 26'. Keel laid October 1, 1940.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

New Construction:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2,100-hp engines. **Keel laying dates, No. 60, November 10, 1940;** No. 61, March 1, 1941. **Launching dates,** August 8, October 8, November 10, 1940; March 15 and July 15, 1941. Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Hulls Nos. 62-65, four C-3 cargo ships for U. S. Maritime Commission. 492' x 69' x 42'6"; 8900 tons; 8500-hp; steam propulsion; $2,990,-000 each.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

New Construction:

Six coal barges. 175' x 26' x 11'; for stock.

Fifteen freight barges for Inland Waterways Corp., St. Louis, Mo. 280' x 48' x 11'.

THE AMERICAN SHIP BUILDING CO.
Cleveland, Ohio

New Construction:

Twelve net tenders for U. S. Navy.

BATH IRON WORKS
Bath, Maine

New Construction:

Hulls Nos. 180-181, DD429, Livermore; and DD430, Eberle; two 1620-ton destroyers for U. S. Navy. **Delivery dates, No. 180, October 7, 1940;** No. 181, December, 1940.

Hulls Nos. 182-183, DD437, Woolsey; and DD438, Ludlow; two 1620-ton destroyers for U. S. Navy. Delivery dates May and July, 1941.

Hulls Nos. 184-187, four cargo ships for American Export Line. 400' x 60' x 39'. Delivery dates September and October, 1941, and April and June, 1942.

Hulls Nos. 188-189, DD457 and DD458, two destroyers for U. S. Navy. Delivery dates December, 1941, and February, 1942.

Hulls Nos. 190-195, DD449-451, 467-469, six destroyers for U. S. Navy.

Hulls Nos. 196-206, DD507-DD517, eleven destroyers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

New Construction:

Hulls Nos. 1470, Benson; and 1471, Mayo; two 1600-ton destroyers for U. S. Navy. **Delivery dates, July 25 and September 18, 1940.**

Hull No. 1478, Massachusetts, 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego; and 1480, San Juan; two 6000-ton cruisers for U. S. Navy. Keels laid March 27 and May 15, 1940.

Hulls Nos. 1481-1484, four cargo vessels for U. S. Maritime Commission. 450' x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons. Launching date, No. 1483, September 21, 1940. **Delivery dates, No. 1481, August 1, 1940; No. 1482, September 5, 1940.**

Hulls Nos. 1485-1487, three tankers. 502' x 68' x 37'; 21,000 tons. Keels laid July 1, August 7 and September 26, 1940.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co. 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co. 15,450 tons dwt.

Hulls Nos. 1494-1497, four heavy cruisers for U. S. Navy.

Hulls Nos. 1498-1501, four light cruisers for U. S. Navy.

Hulls Nos. 1502-1503, two light cruisers for U. S. Navy.

Hulls Nos. 1504-1507, four heavy cruisers for U. S. Navy.

Hulls Nos. 1508-1511, four aircraft carriers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

New Construction:

Hull No. 4331, Esso Albany, 16,300 dwt ton tanker for Standard Oil Co. of N. J. 18 knots speed. **Delivered September 25, 1940.**

Hull No. 4339, Deltargentino, passenger and cargo ship for Mississippi Shipping Co. Delivery date, December 1, 1940.

Hulls Nos. 4341, Robin Locksley; 4342-4343; three cargo vessels for Seas Shipping Co. LOA 485', LBP 450', beam 66', draft 43'. **Launching date, No. 4341, October 5, 1940.**

Hulls Nos. 4344, James Lykes; 4345, Lipscomb Lykes; 4346-4348; five C-1 cargo vessels. LOA 417, LBP 395', beam 60', depth 37'6". Launching dates, No. 4344, July 27, 1940; No. 4345, September 7, 1940.

Hulls Nos. 4350-4352, three cargo vessels for Seas Shipping Co. 450' x 66' x 34'; 6300 hp; 8500 gross tons.

Hulls Nos. 4353-4356, four oil tankers for Socony Vacuum Oil Co. 487'6" x 68' x 37'; 12,000 hp; 9,800 gross tons.

Hull No. 4357 oil tanker for Union Oil Co. of Calif. 442' x 63' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4358-4359, two oil tankers for Socony Vacuum Oil Co. 487'6" x 68' x 37'; 12,000 hp; 9800 gross tons.

Hulls Nos. 4360-4361, two oil tankers for Union Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4362-4364, three cargo and passenger vessels for Mississippi Shipping Co. 465' x 65'6" x 39'9"; 8600 hp; 8300 gross tons.

Hull No. 4365, oil tanker for Richfield Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4367-4368, two oil tankers for Panama Transport Co. 487'6" x 68' x 37'; 7000 hp; 9800 gross tons.

Hull No. 4369, oil tanker for Continental Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

New Construction:

Hulls Nos. 8015-8019, five C-1-B design cargo vessels for U. S. Maritime Commission. 417'9" x 60' x 37'5". **Launching dates, No. 8015, October 3, 1940; No. 8016, November 2, 1940;** No. 8017, January 1, 1941; No. 8018, March 15, 1941; No. 8019, April 15, 1941. Delivery dates April 1, June 1, August 1 and November 1, 1941, and January 1, 1942.

Hulls Nos. 8021-8022, two destroyers for U. S. Navy.

Hulls Nos. 8023-8032, ten destroyers for U. S. Navy.

BOSTON NAVY YARD
Boston, Mass.

New Construction:

DD426, Lansdale, 1600-ton destroyer. Completion date November 1, 1940.

DD433, Gwin, 1600-ton destroyer. Completion date March 1, 1941.

DD434, Meredith, 1600-ton destroyer. Completion date May 1, 1941.

DD441, Wilkes, 1600-ton destroyer. Completion date July 1, 1941.

DD442, Nicholson, 1600-ton destroyer. Completion date September 1, 1941.

DD461, 1600-ton destroyer. Completion date February 12, 1942.

DD462, 1600-ton destroyer. Completion date April 12, 1942.

DD472, 1600-ton destroyer. Completion date March 1, 1943.

DD473, 1600-ton destroyer. Completion date May 1, 1943.

DD474, 1600-ton destroyer. Completion date July 1, 1943.

DD475, 1600-ton destroyer. Completion date September 1, 1943.

DD476, 1600-ton destroyer. Completion date January 1, 1943.

AVP21, Humboldt, seaplane tender. Completion date October 12, 1941.

AVP22, Matagorda, seaplane tender. Completion date December 12, 1941.

YSD11, seaplane wrecking derrick. Completion date November 15, 1940.

YSD20, seaplane wrecking derrick. Completion date May 1, 1941.

YSD22, seaplane wrecking derrick. Completion date January 1, 1941.

YSD23, seaplane wrecking derrick. Completion date March 1, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

New Construction:

BB 55, North Carolina, battleship. LBP 714'0", beam to outside armor 108'0"; std. displ. 35,000 tons; geared turbine engines; express type boilers. Contract delivery date September 1, 1941; estimated delivery date, October 15, 1941.

BB 61, Iowa, battleship. LOA 880", beam 108'; 4500 tons standard displacement; geared turbines. Contract delivery date August 1, 1943.

BB 63, Missouri, battleship. LOA 880', beam 108'; 4500 tons standard displacement; geared turbines. Order placed June 12, 1940.

IRA S. BUSHEY & SONS, INC.
Brooklyn, N. Y.

New Construction:

Two 82' diesel tugs each powered with 575-hp F-M engine. **Delivery dates November 15 and 30, 1940.**

Two wooden deck scows for Tri-Boro Scow Co. 118' x 36' x 10'. **Delivery dates October 15 and November 15, 1940.**

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

New Construction:

Hull No. 167, PC452, sub-chaser for U. S. Navy. 174' long. Delivery date May, 1941.

Hulls Nos. 168-170, YT145-YT148, three harbor tugs for U. S. Navy. 100' long. Delivery date February, 1941.

THE DRAVO CORPORATION
Engineering Works Division
Pittsburgh, Pa., and Wilmington, Del.

New Construction:

Hull No. 1659, welded steel oil barge for Pacific Dry Dock & Repair Co., San Francisco, Calif. 148' x 38' x 9'; 426 gross tons.

Hull No. 1678, caisson for Panama Canal Bureau of Yards and Docks, Navy Dept., Washington, D. C.; 1598 gross tons.

Hulls Nos. 1697-1701, five welded car floats for Pennsylvania Railroad, Philadelphia. 250' x 34' x 9'1"; 2970 gross tons.

Hulls Nos. 1710-1711, two type W-7 welded coal barges for stock. 175' x 26' x 10'8"; 943 gross tons.

Hulls Nos. 1730-1732, three welded steel auto carrier barges for Commercial Barge Lines, Pontiac, Mich. 175' x 30' x 10'8"; 1638 gross tons.

Hulls Nos. 1733-1735, three type W-7 welded bulk cargo barges for stock. 175' x 26' x 10'8"; 1416 gross tons.

Hull No. 1736, welded fuel oil barge for Brooklyn Edison Co. 128'4" x 23'6" x 14'; 375 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges for stock. 175' x 26' x 10'8"; 4720 gross tons.

Hull No. 1750, 1300-hp twin-screw diesel towboat for stock. 176' x 36' x 10'; 590 gross tons.

Hull No. 1751, 760-hp twin-screw diesel towboat for stock. 145' x 27' x 11'9"; 318 gross tons.

Hulls Nos. 1752-1756, five welded steel oil barges for stock. 195' x 35' x 9'9"; 2990 gross tons.

Hulls Nos. 1757-1759, three welded coal barges for M. & J. Tracy, Inc., New York City. 134' x 34' x 17'; 2301 gross tons.

Hulls Nos. 1760-1767, eight welded sand and gravel barges, deck type, for Warner Co., Philadelphia. 130' x 34' x 10'; 3616 gross tons.

Hulls Nos. 1768-1775, three steel lighters for U. S. Navy Dept., Washington, D. C. 110' x 34' x 11'3"; 2672 gross tons.

Hulls Nos. 1776-1780, five covered cargo barges for stock. 175' x 26' x 11'; 2650 gross tons.

Hulls Nos. 1781-1784, four covered cargo barges for River Terminals Corp., New Orleans. 2612 gross tons.

Hulls Nos. 1785-1790, six sand and gravel barges for Keystone Sand Division. 135' x 27' x 8'; 1530 gross tons.

Hulls Nos. 1791-1795, five covered cargo barges for stock. 175' x 26' x 11'; 2650 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

New Construction:

Hull No. 39, Gar (SS206). Standard displacement 1475 tons. Keel laid December 27, 1939.

Hull No. 40, Grampus (SS207). Standard displacement 1475 tons. Keel laid February 14, 1940.

Hull No. 41, Grayback (SS208). Standard displacement 1475 tons. Keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204). Standard displacement 800 tons. Launched September 28, 1940.

Hull No. 42, Gato (SS212). Standard displacement 1500 tons. Keel laid October 5, 1940.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

New Construction:

Hull No. 167, C-3 cargo vessel for U. S. Maritime Commission.

Hulls Nos. 168-169, CL51, Atlanta; and CL52, Juneau; two 6000-ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison; and 171, Ericsson; two torpedo boat destroyers for U. S. Navy. Keels laid March 18, 1940.

Hulls Nos. 172, Joseph Lykes; 173-176; five C-1 cargo vessels for U. S. Maritime Commission. Keels laid, Nos. 174-175, June 6, 1940; No. 176, August 12, 1940. Launching dates, No. 172, August 3, 1940; No. 173, October 5, 1940.

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo vessels for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co. 13,000 dwt tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co. 15,000 dwt.

Hulls Nos. 194-197, four destroyers for U. S. Navy.

Hulls Nos. 198-203, six destroyers for U. S. Navy.

Hulls Nos. 204-205, two destroyers for U. S. Navy.

GULF SHIPBUILDING CORP.
Chickasaw, Ala.

New Construction:

Four 2100-ton destroyers for U. S. Navy.

GULFPORT BOILER & WELDING WORKS, INC.
Port Arthur, Texas

New Construction:

Hulls Nos. 153 and 167-168, three diesel-electric tugs for General Motors Corp. 100' x 24' x 12'4"; 1000-shp G. M. diesel and auxiliary each. Delivery date, No. 153, October 20, 1940.

Hull No. 157, diesel tug for U. S. Navy. 70' x 18' x 10'3"; 400-hp Atlas diesel and auxiliary. Delivery date December 15, 1940.

Hull No. 165, oil barge for E. Eggers Towing & Transp. Co., Houston, Tex. 135' x 30' x 8'.

Hull No. 166, oil barge for G. B. Zigler Co., Jennings, La. 205' x 40' x 10'

Hull No. 169, oil barge for Edwards Transportation Co., Houston, Tex. 100' x 28' x 7'.

Hull No. 170, deckload barge for Brown & Root, Houston, Tex. 80' x 24' x 5'.

Hull No. 171, oil barge for stock. 100' x 26' x 8'.

THE INGALLS SHIPBUILDING CORP.
Pascagoula, Miss., and Decatur, Ala.

New Construction:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 268, 297, 298, three C-3 IN passenger and cargo vessels for U. S. Lines.

One oil tanker for Husky Transit Corp., Minneapolis, Minn. 235' x 35' x 14'. Estimated completion date January 3, 1941.

One derrick barge for Dunbar & Sullivan Dredging Co., Detroit, Mich. 100' x 43' x 10'. Completion date November 1, 1940.

Three steam turbine vessels for American-South African Lines. 492' long, 69'6" beam; 9500 shp; 18,000 ton dis.; 19 knots speed.

Hulls Nos. 265-267, three C-3-P cargo and passenger vessels for American-South African Lines. 492' x 69'6"; 9500 shp; 18,000 tons dis.; 16½ knots speed. Completion dates November 15 and December 16, 1941; and January 15, 1942.

Hulls Nos. 283, 294-296, four C-3-S-A1 cargo vessels for U. S. Maritime Commission. Completion dates February 17, March 29, May 8 and June 17, 1942.

Three oil barges for Tropical Oil Co. 125' x 30' x 7'. Completion date December 1, 1940.

One oil barge for Goyer Oil Co., Greenville, Miss. 135' x 33' x 7'9". Completion date January 15, 1941.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

New Construction:

One steel twin-screw carferry. 406' x 57' x 23.5'. Approximate delivery date, January 4, 1941.

One steel twin-screw diesel towboat. 140' x 35' x 8'6". Delivery date, November, 1940.

JOHN H. MATHIS CO.
Camden, N. J.

New Construction:

Four anti-submarine net tenders for U. S. Navy.

One bulk carrier tanker 265' long for Thos. Bowes, N. A.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

New Construction:

AV4, Curtiss, seaplane tender for U. S. Navy. Launched April 20, 1940.

AV5, Albemarle, seaplane tender for U. S. Navy. Keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland; and CL56, Columbia; two cruisers for U. S. Navy. Order placed March 23, 1940.

CL57 and CL58, two cruisers for U. S. Navy. Order placed June 12, 1940.

AV7, Currituck, seaplane tender for U. S. Navy.

CL59-CL61, three cruisers for U. S. Navy.

CB1-CB6, six cruisers for U. S. Navy.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

New Construction:

Hull No. 372, Esso Columbia, oil tanker for Standard Oil Company of New Jersey. Gross tonnage about 11,500 tons; LBP 525', breadth molded 75', depth molded 39'. Launched September 18, 1940.

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379-384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission. 465' x 69'6" x 42'6"; gross tonnage about 9100 tons. Keels laid, No. 382, February 5, 1940; No. 383, June 10, 1940; No. 384, August 12, 1940. Launching dates, No. 379, June 7, 1940; No. 380, August 7, 1940; No. 381, October 4, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single-screw combination passenger and cargo vessel for U. S. Maritime Commission. 465' x 69'6" x 42'6"; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. 465' x 69'6" x 42'6"; gross tonnage about 7,700. Keel laid, No. 387, August 12, 1940. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. 435' x 63' x 40'6"; gross tonnage about 8,000. Delivery date August 1, 1941.

Hulls Nos. 390-391 (CL62-CL63), two light cruisers for U. S. Navy.

Hulls Nos. 392-394 (CV9-CV11), three aircraft carriers for U. S. Navy.

Hulls Nos. 395-398 (CV12-CV15), four aircraft carriers for U. S. Navy.

Hulls Nos. 399-400 (CL80-CL81), two light cruisers for U. S. Navy.

PORTSMOUTH NAVY YARD
Portsmouth, N. H.

New Construction:

Submarines SS201, Triton; SS202, Trout; SS209, Grayling; SS210, Grenadier; SS205, Marlin; SS228-SS235.

THE PUSEY & JONES CORP.
Wilmington, Del.

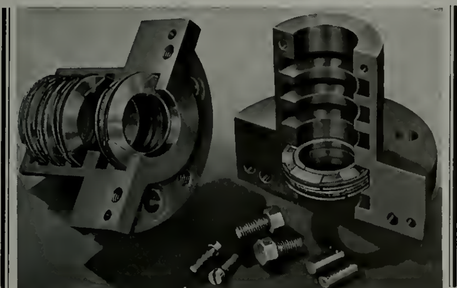
New Construction:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp. 300' x 65' x 20'; 1600 gross tons; steam Una-Flow propulsion; 3600 hp; 16 knots speed; cost $1,000,000. Delivery date November, 1940.

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 413' x 60' x 37'6"; 5000 gross tons; turbine propulsion; 4000 hp; 14 knots speed; cost $1,928,000. Approximate launching date November 1, 1940; delivery dates January and March, 1941.

Hull No. 1079, tug for Long Island R. R. Co. 105' x 24' x 12'11"; 210 gross tons; Una-Flow steam machinery; 800 shp; 11 knots speed. Launching date November 15, 1940; delivery date December, 1940.

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co. 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 shp; 15 mph speed. Launching date December, 1940; delivery date 1941.



SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

New Construction:

Hulls Nos. 186-189, four C-3 single-screw combination passenger and cargo vessels. 465' x 69'6" x 42'6"; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 193, one tanker for Standard Oil Co. of Calif. 375' x 57' x 29'; 7000 dwt tons. Delivery date March, 1941.

Hulls Nos. 195 and 197, two tankers for Standard Oil Co. of N. J. 18,000 dwt. **Delivery dates, No. 195, October 1, 1940;** No. 197, June, 1941.

Hull No. 196, one tanker for Sun Oil Co. 18,000 tons. Delivery date December 1, 1940.

Hull No. 198, one tanker for Texas Co. 13,785 tons. Delivery date July, 1941.

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission. 7500 tons. Delivery dates June, August, October, December, 1941; January, March, May, July, 1942.

Hull No. 207, diesel tanker for Panama Transport Co. 18,000 dwt. Delivery date August, 1941.

Hulls Nos. 208-210, three tankers for Petroleum Shipping Co. 16,400 dwt; steam turbine. Delivery dates October, December, 1941; February, 1942.

Hull No. 211, tanker for Atlantic Refining Co. 19,400 tons. Delivery date August, 1941.

Hull No. 212, tanker for Sun Oil Co. 18,000 tons. Delivery date June, 1941.

Hulls Nos. 213-216, four tankers for Panama Transport Co. 18,000 tons; steam turbine. Delivery dates March, July and September, 1942; and March, 1943.

Hulls Nos. 219-220, two diesel tankers for Panama Transport Co. 18,000 dwt. Delivery dates March and June, 1944.

Hulls Nos. 221-222, two tankers for Keystone Tankship Corp. 16,400 tons; steam turbine. Delivery dates June and July, 1942.

Hulls Nos. 223-225, three 16-knot tankers for The Texas Co. Single-screw steam turbine; 13,285 tons dwt. Delivery dates August, September and October, 1942.

Hull No. 226, tanker for Kaymar Tankers, Inc. 16,400 tons; steam turbine. Delivery date November, 1942.

Hulls Nos. 227-228, two tankers for Seamar Tankers, Inc. 16,400 tons; steam turbine. Delivery dates January and February, 1943.

Hull No. 229, tanker for Atlantic Refining Co. 19,400 tons. Delivery date September, 1941.

TAMPA SHIPBUILDING & ENGINEERING CO.
Tampa, Fla.

New Construction:

Hulls Nos. 34-36, three C-2 type cargo vessels for U. S. Maritime Commission. 459' x 63' x 31'6"; 9291 dwt tons; diesel powered.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission. 459' x 63' x 31'6"; 9291 dwt tons.

Ultra H. F. Transmitter-Receiver

A new portable ultra-high-frequency transmitter-receiver, having 75 calibrated frequency channels from 28 to 65 megacycles, has just been announced by Westinghouse Electric & Manufacturing Company. Compact, and weighing only thirty pounds complete with batteries, antenna, microphone, headphones and key, this type HR communicator combines 'phone or continuous wave operation. It is ideal for communication between scattered field groups, as in traffic, fire, large scale construction or rescue control work.

A crystal frequency standard permits calibration for accurate adjustment of both transmitter and receiver to the desired frequency. Equipment is so designed that several sets in a relatively small area can operate on the same channel without heterodyne interference. Sending on one channel, receiving on another, is easy with the push-to-talk send-receive control.

Tube complement consists of 3-958 triodes, 1-959 pentode, 2-30 triodes, and 1-1E7G twin pentode. Radio frequency carrier output is 0.5 watt minimum; average receiver sensitivity is 5 micro-volts. Power is obtained from a plug-in type dry battery good for 10 hours' continuous operation, or considerably longer on intermittent service. Entire equipment is resistant to moisture, salt sea air and temperature variations; can be placed in full field operation in less than thirty seconds.

High-frequency transmitter-receiver

Radio Interference Filter

The J. W. Miller Company of Los Angeles announces a new radio interference filter designed especially for marine direct-current generators to eliminate the radio interference generated at the commutator.

This filter consists of two choke coils and four condensers, neatly mounted, with suitable connections and fuses, in a metal case 18 inches long, 16 inches wide and 10 inches high. The total weight is 141 lbs.

The chokes are duo-lateral wound with a special No. 1 B. & S. cable made up of 520 strands of No. 28 copper. This cable is double cotton covered, and the entire choke assembly is impregnated with a special insulating varnish compound. These chokes are said to be the largest duo-lateral wound chokes ever made. The capacity is 200 amperes at 250 volts.

Each of the four condensers has a 2-mfd rating. They are of the non-inductive wound paper type, and are tested at 1440-volt 60-cycle a.c.

Trade Literature

Marine Radio Telephone Equipment, Publication T1704 of the Western Electric Co., Specialty Products Division.

This six-page brochure in blue and black describes the Western Electric Marine Radio Telephone Equipment No. 226C, a 25-watt set operating on 110-volt, 60-cycle, a.c. current. This set includes a radio transmitter, radio receiver, telephone hand set and built-in loud speaker.

This equipment is especially adapted to yachts, fishing fleets, workboat fleets and all coastwise and harbor craft.

Two New Sizes In Caterpillar Marine Diesels

Two new four-cylinder marine diesel engines have been announced by Caterpillar Tractor Co. The addition of these two to the line gives the company a complete run of sizes from 25 to 135 bhp.

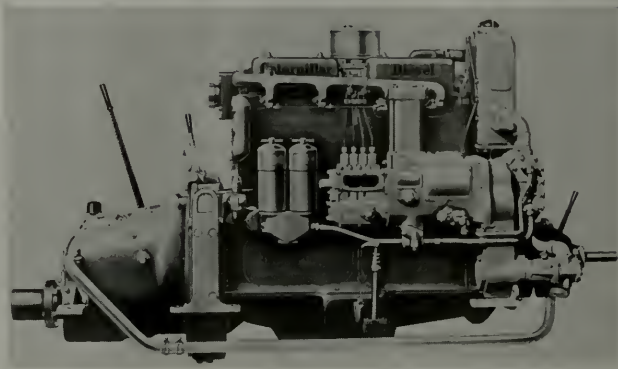
The new units are of medium speed and medium weight, especially well suited for the workboat field. Ratings are conservative, and the engines are characterized by mechanical simplicity.

The larger of the two new engines is the model D8800, which has a bore and stroke of 5¾″ x 8″, and develops 70 horsepower at 900 rpm. The D7700 engine, with a 5¼″ bore and a stroke of 8″, develops 60 horsepower at the same rpm. Ratings are unusually conservative. The figure given is for continuous service, which means full load operation day in and day out, throughout the year, if desired.

A closed type heat exchanger with gear-driven centrifugal jacket water pump and gear type raw water pump is standard equipment. A water-cooled lubricating oil cooler is also provided. An independent two-cylinder, vertical, four-cycle gasoline engine is used to start the diesel. Electric starting is available for both diesel and starting engine, if desired.

The fuel system offers an individual injection pump for each cylinder. These pumps are factory set, and require no adjustment while in service. The fuel injection valves are of the spring-operated type, and when the pressure of the fuel oil, built up by the pump, overcomes the tension of the valve spring, the valve head lifts and fuel is sprayed into the precombustion chamber through a single orifice. The comparatively large size of this orifice practically precludes ever having a clogged spray valve. Valves, like the pumps, are set at the factory, and require no attention on the job. Both pumps and valves are of "Caterpillar" design and manufacture.

A spring-loaded flyball-type governor is mounted on the camshaft gear. The engine is always under the control of this governor, so that the throttle lever is really the governor spring control. The throttle setting determines the approximate speed of the engine, and the governor controls the fuel injection pumps to supply the quantity of fuel necessary to balance the load.



The "Caterpillar" marine diesel engines are equipped with twin disk reverse gear, and are ready for operation when but five connections have been made. It is only necessary to connect the exhaust to atmosphere, sea water suction to raw water line, heat exchanger outlet to overboard discharge, fuel oil line to main storage tank, and to align the thrust bearing shaft and connect it with the propeller shaft.

Trade Literature

Valves, Pipe Fittings, Fire Hydrants, 240 pages, letter-size, cloth bound; Catalog No. 63, published by The Kennedy Valve Manufacturing Company. This book is an exceptionally complete presentation of data on bronze and iron-body valves for low, standard and higher pressures, standard bronze and malleable-iron screwed fittings, standard cast-iron flanged fittings and flanges, fire hydrants and various valve specialties.

Characterized by large illustrations throughout, this book has several unique features for convenience in use. For example, in the section on iron-body valves, dimensions and prices of valves and accessories are all on facing pages, thereby minimizing cross-references to other pages.

A section is devoted to descriptions of valve accessories for various operating conditions. Additional features are: recommendations for the selection of valves and fittings; suggestions for operation, care and maintenance of valves; and much useful engineering data. Five indexes, and tabulations of references on all pages of listings and dimensions, greatly facilitate the use of the catalog in quickly finding desired information.

The Babcock & Wilcox Tube Company, Beaver Falls, Pa., has just issued Technical Bulletin 11-C, ***"Specifications for Seamless Tubular Products."*** The bulletin contains specifications established for carbon steel and alloy steel tubes by the American Society for Testing Materials and The Association of American Railways, and specifications established by The Babcock & Wilcox Tube Company for high chrome and stainless alloy tubes.

The specifications cover the manufacture, finish and workmanship, chemical and physical properties, tests and permissible variations in weights and dimensions of tubes and pipe.

A limited supply is available for distribution to executive departments of seamless tubing users. Please write for copies on your company letterhead, mentioning Pacific Marine Review.

PACIFIC MARINE REVIEW

Advertisers

PACIFIC MARINE REVIEW

DECEMBER, 1940

Official Organ

Pacific American Steamship Association

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Shipowners Association of the Pacific Coast

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PACIFIC MARINE REVIEW

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PACIFIC MARINE REVIEW

DECEMBER
1940

Random Thoughts On Crisis and Christmas

As we American citizens approach the Christmas season in this year of our Lord 1940, we are assailed on all sides by propaganda largely directed for the purpose of impressing us with the idea that we as a nation are facing the gravest crisis in the history of the world. That there is much truth back of this propaganda is evident from the headlines of the daily press and from the content of many thoughtful articles in our best magazines.

In such times as those in which we are now living, it is of the utmost importance that American citizens should approach national and local policies with cool, thoughtful, unselfish appraisal. This is particularly true when the policy under consideration is one affecting national defense.

Let us remember that our forefathers have faced crises in history—crises which to them appeared as momentous as any we of today are facing.

The words that great men speak, and the deeds they do, under crises, form the important milestones in recorded history. Back of these words and deeds always is the attitude of the people—you and I—and for us there comes the high duty in crisis of carrying on "as usual"—of remembering all those common loyalties and aspirations that alone make life worth while and full of meaning.

With these thoughts in mind, let each of us read with new appreciation the words written by William Tyler Page in 1917, and officially adopted as the American Creed:

"I believe in the United States of America as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic, a sovereign nation of many sovereign states; a perfect union one and inseparable; established upon those principles of freedom, equality, justice and humanity for which American patriots sacrificed their lives and fortunes. I therefore believe it is my duty to my country to love it, to support its Constitution, to obey its laws, to respect its flag, and to defend it against all enemies."

So, carrying on "as usual," we wish all of our friends

A Very Merry Christmas and a Happy New Year

for we still have a strong and an abiding faith that "Peace on Earth" is possible to men of Good Will.

S. S. *Cape Mendocino* afloat in channel after launching. Note the oil well derricks of the harbor oil field in the near and distant background

Consolidated Steel

Puts Over First C-1 Steamer

Thursday, November 14, marked a new milestone in the progress of shipbuilding in Southern California. On that day, some 20,000 enthusiastic spectators assembled to witness the launching of the first seagoing merchant vessel launched from a Southern California shipyard in seventeen years.

At the Long Beach shipyard of the Consolidated Steel Corporation, this crowd saw a complete-length hull sitting on blocks with her broadside parallel to the edge of the water. At the bow end of this hull was half the length of another hull waiting to be completed after the first hull was launched.

On a small platform at the bow, and back of this platform on the uncompleted hull, were assembled officials: of Los Angeles and Long Beach; of the American Bureau of Shipping; of the U. S. Maritime Commission; of the New York and Cuba Mail S. S. Co., to whom the ship is allocated; and of the Consolidated Steel Corporation.

Right at the bow of the ship stood the sponsor, Mrs. Frank Buck, wife of the congressman from Vacaville, accompanied by her matron of honor, Mrs. Erving Humphrey, wife of a U. S. Maritime Commission official. These two ladies were under the expert guidance of R. W. Gerhart of Consolidated Steel.

Meanwhile the blocks were being knocked away by the launching gang, who had already wedged the weight of the hull onto the launching cradle. Presently the "all clear" signal is given—the hawsers are cut—Mrs. Buck smashes a bottle of California wine across the bow and pronounces the words, "I christen thee Cape Mendocino"—and the hull is away.

She toppled gracefully over the edge of the standing ways, dropping about eight inches into the quiet waters of Channel No. 3, and quietly rocked to a stand in mid channel.

As she hit the water, a great wave of water and spray shot into the air and rolled away to chase the crowd off the opposite bank.

In short, this was a very successful and auspicious launching amid the derricks of the harbor oil field, and the Consolidated Steel Corporation can be justly proud of their first hull.

Cape Mendocino ready for launching ↑

Mrs. Frank Henry Buck, sponsor, ready to christen the ship; Mrs. Erving Z. Humphrey, matron of honor; and Mr. R. W. Gerhart, Consolidated Steel Corp, Ltd. ↓

→

Stern view of Cape Mendocino taking the big plunge. Note crowd, right rear, on half hull, which will be promptly completed

↓ *Side view of ship taking first dip in the briny*


FORTY-EIGHTH ANNUAL BANQUET
THE SOCIETY OF
NAVAL ARCHITECTS AND MARINE ENGINEERS
THE WALDORF-ASTORIA NEW YORK
NOVEMBER 15,
DRUCKER - HILBERT CO.

Naval Architects and Marine Engineers

Rear Admiral Emory S. Land assumed office

Shipbuilding and marine engineering contracts have increased so remarkably in the past year that one naturally expected a record-breaking meeting of the Society of Naval Architects and Marine Engineers in New York this fall. However, our publisher, J. S. Hines, a seasoned veteran at these affairs, reports, "This forty-eighth annual banquet was the most imposing that it has been my privilege to attend in the past twenty-five years."

Our illustration above shows some of the 945 members of the Society who sat down to dine. They represent the cream of the technical staffs and the executives of the major shipbuilding and marine machinery and equipment manufacturers of America. Incidentally, this banquet was exclusively for members, and the members present composed almost one-half of the entire membership.

Seated at the speakers' table were:

H. Gerrish Smith, President of the Society.

Ernest H. Rigg, Honorary Vice President of the Society.

Prof. H. L. Seward, Prof., Mechanical and Marine Engineering, Yale Univ.

W. L. R. Emmet, Honorary Vice President of the Society.

Clifford D. Mallory, President, C. D. Mallory & Company.

C. W. Middleton, Vice President, Babcock & Wilcox Company.

Theodore E. Ferris, Honorary Vice President of the Society.

William S. Newell, President, Bath Iron Works Corporation.

Roger Williams, Vice President, Newport News Shipbuilding and Dry Dock Company.

Captain Claud A. Jones, USN, Head, Shipbuilding Section, Bureau of Ships, Navy Dept.

Arthur B. Homer, Vice President, Bethlehem Steel Company, Shipbuilding Division.

Captain R. W. Dempwolf, USCG, Commander, New York District, USCG.

Hugo P. Frear, Honorary Vice President of the Society.

L. H. Korndorff, President, Federal Shipbuilding and Dry Dock Company.

John G. Pew, President, Sun Shipbuilding and Dry Dock Company.

John D. Reilly, President, Todd Shipyards Corporation.

Emmett J. McCormack, Treasurer, Moore-McCormack Lines, Inc.

Henry R. Sutphen, Vice President, Electric Boat Company.

George W. Codrington, General Manager, Diesel Engine Division, General Motors Corp.

H. W. Warley, Vice President, Ore Steamship Company.

Arthur M. Tode, Honorary President, Propeller Club of the United States.

J. H. King, Secretary and Treasurer of the Society.

Captain J. T. G. Stapler, USN, Chief of Staff, 3d Naval District.

Frank J. Taylor, President, American Merchant Marine Institute, Inc.

Joseph W. Powell, Past President of the Society.

Rear Admiral R. R. Waesche, USCG, Commandant, U. S. Coast Guard, Washington, D. C.

John F. Metten, President, New York Shipbuilding Corporation.

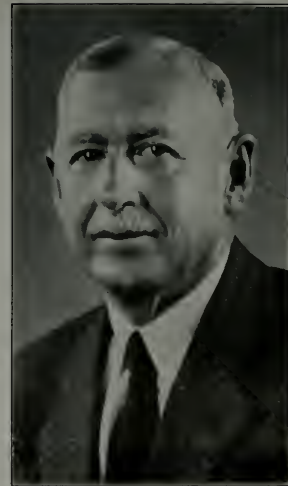
Rear Admiral Emory S. Land, (CC) USN (Ret.), President-Elect of the Society.

Rear Admiral A. H. VanKeuren, USN, Assistant Chief, Bureau of Ships, Navy Department.

Rear Admiral George H. Rock (CC), USN, (Ret.), Past President of the Society.

Commander R. S. Field, USN, Director, Bureau of Marine Inspection and Navigation.

Captain J. J. Broshek, USN, Manager, Navy Yard, New York.



John Farrell Metten received medal

Commander H. L. Vickery, USN, Commissioner, U. S. Maritime Commission.

J. Lewis Luckenbach, President, American Bureau of Shipping.

After a very excellent dinner, H. Gerrish Smith, retiring president, in a very happy speech, presented the amazing growth in American shipbuilding activities during the past year, and the satisfactory progress of the affairs of the Society.

He then made presentation of the D. W. Taylor medal, highest honor award of the Society, to John Farrell Metten, president of the New York Shipbuilding Corporation.

This award "brought down the house." Jack Metten is one of the most popular members of the Society, and is also most highly deserving of this honor. He received a great ovation, with the whole assemblage standing and cheering to do him honor.

Retiring President Smith then introduced incoming president Rear Admiral Emory S. Land, chairman of the U. S. Maritime Commission.

"Milling around after the speeches," reports our observer, "I contacted many friends, including (in addition to those already listed as sitting at the speakers' table) the following: •

J. E. Schmeltzer, David Arnott, L. O. Arringdale, Andrew Baxter, Jr., M. W. Buchanan, J. S. Dickie, Ernest E. Eyman, Thomas J. Farley, Joseph E. Garabrant, Robert F. Hand, A. M. N. Holzapfel, J. W. Weber, Jr., William H. Schultze, Arthur R. Pegg, H. L. Watson, Joseph A. Moore, Jr., James French, Robert E. Friend, Sir William Isherwood, J. W. Stewart, W. A. Stewart, E. H. Letourneau, Robert Haig, Frederick D. Herbert, William B. Jupp, N. J. Pluymert, James Plummer, Frank Hansen, E. L. Stewart, Captain H. S. Howard, H. F. Norton, W. F. Gibbs, John W. Hudson, John F. Nichols, W. W. Smith, W. B. Nickum, Joseph J. Nelis, E. G. Bailey, Harte Cooke, John F. Cooke, D. W. Niven, B. V. E. Nordberg, H. L. Watson, Wilfrid O. White, J. C. Workman, Amos S. Hebble, Arthur Hiltebrant, A. H. Hoblemann, Albert A. Hopeman, Jr., Frank A. Hodge, O. D. Colvin, S. E. Allen, James F. Goodrich, H. C. Evans, H. S. Falk, C. C. Doubleday, A. M. Doxsey, Mark R. Colby, S. D. Brown, L. W. Allen, Robert I. Ingalls, Jr., Melvin B. Benson, L. S. Andrews, A. M. Butterfield, George H. Hill, Hans H. G. Bauer, Edward J. Kaiser, G. H. Bates, Francis L. Corbin, John S. Leslie, R. C. Lee, Leif W. Larssen, J. A. Slater, O. C. Pahline, J. C. Wylie, R. H. Morse, Jr., L. W. Scott, Jr., J. B. Woodward, Jr., W. W. Barnes, Joseph Haag, Jr., Charles M. Reagle, M. A. Laswell, Maurice Nicholls, J. V. Santry, W. M. Kennedy, Harold M. G. Wick, Harry Barnes, Russel C. Jones, R. W. Bayerlein, Hollis Walter, O. B. Whitaker, Robert M. Bent, H. Christophersen, Lloyd S. Radcliffe, C. C. Knerr, J. P. Thompson, Sten Soderberg, R. J. Bouffard, Edward Battersby, Harlan R. Jessup, L. R. Sanford, Ernest Kreher, J. J. Lincoln, Jr., R. K. Kelly, George W. Selby, F. E. Powell, C. R. Waller, E. H. Lang, Martin L. Katzenstein, John Livingston, W. V. Sauter, Robert H. Wager, R. H. Kingsley, A. H. Warren, Jr., K. O. Keel, J. P. Kiesecker, William L. Lalor, P. H. Kirwin, H. V. Petersen, W. E. Wallenberg and Gordon Lefebvre.

Technical Papers

The annual meeting of the Society of Naval Architects and Marine Engineers, held in the Engineers' Building, 29 West 39th Street, New York, on November 14 and 15, 1940, produced thirteen papers of unusual interest to the profession. We present herewith short abstracts of these papers:

(1) Notes on Rolling and Lurching—A Proposed Criterion

By E. H. Rigg

The author of this paper is the naval architect of New York Shipbuilding Corporation, Camden, N. J. In 1902 he came from Glasgow, Scotland, to join the technical staff of that organization, after a very thorough Scotch training as a shipbuilder and naval architect. He is now an honorary vice president of the Society of Naval Architects and Marine Engineers. He has presented many useful papers at Society meetings.

In this paper he reviews the work done on this subject by himself and others, and, to use his own words, proposes a method to evaluate a "ship's tendency to odd rolls or lurches," such as often occur at sea under certain conditions—a method in which the "work involved is such as can be handled readily during the design stage, and hair-splitting accuracy is neither necessary nor practical."

After considering all the variables involved, and the previous work of many authorities on Rolling Tendencies, the author puts forward the following formula for Lurching Criterion (C) "with definite hesitation, but with a feeling that it will give a good measure of the liability to lurching":

$$C = \left(\frac{\text{beam}}{K}\right)^2 \times \frac{BG}{d} \times \frac{1}{a}$$

where

K is radius of gyration

B is center of buoyancy

G is center of gravity

d is service draft

and $a = \dfrac{\text{Immersed area of midship section}}{\text{Area of a semicircle with radius equal to draft}}$

Taking a stiffness criterion based on metacentric height expressed as a percentage of beam, and a lurch criterion based on (C) values, a combined diagram of these two criteria can be made. The distance between the two curves is a measure of the tendency to lurching.

Examples are worked out from typical designs, and many practical suggestions given for the use of the lurching criterion.

(2) Calculation of Motion and Stresses of a Pitching and Heaving Ship

By Prof. H. L. Hazen and P. T. Nims

This paper describes a method for calculating by the use of the cinema integraph the pitching and heaving motions of a ship in a seaway, and the shearing and bending stresses resulting therefrom. The method is illustrated by such a calculation for a typical ship. A trochoidal wave form, including the Smith correction, is used.

The calculation of buoyant force and moment were greatly facilitated by the use of the cinema integraph, a machine for integrating rapidly the product of two functions, in this case the hull-form function and the pressure-gradient function in the wave. Shears and moments are computed taking into account the actual longitudinal buoyant-force distribution, approximate damping forces and the accelerations in pitch and heave.

The accuracy of the calculations themselves far exceeds that of the underlying assumptions, and is adequate to permit useful engineering comparisons of the calculated stresses among different ships and conditions of loading and sea. The time requirements for these calculations are such that their principal use is likely to be in the study of type problems and important individual ships rather than in routine design. For this research type of problem, however, the method appears to have much promise.

It is interesting that Professor Hazen, head of electrical engineering at the Massachusetts Institute of Technology, and P. T. Nims, an electrical engineer in the American Bosch Corporation, should be presenting a paper on this subject. Nims has carried on much of the research work that developed this intensely interesting optical method of graphic analysis and calculation by moving picture studies. It may be that this method will revise some of the present formulas for strength calculations for ships.

(3) The Effect of Added Weight on Longitudinal Strength

By L. W. Ferris

The author works out simple formulas for hogging and sagging, based on the hogging moment, the sagging moment and a constant K. Value of the constant K for both hogging and sagging conditions is worked out for various types of ships and various positions of weights, and several practical applications are given. The author recommends this method as a short cut for all applications where the added weight is not too great a percentage of the total displacement. It provides a very quick calculation approximating the additional stress due to added weight, and is sufficiently accurate to insure safety.

"If the added weight is only a small per cent of the ship's displacement, the new maximum bending moment will differ by only a small amount from the original. Thus the increment in bending moment due to adding the weight is found by taking the difference between two large and nearly equal quantities. To get an accurate numerical value for the increment, therefore, requires a higher order of precision in the calculation of the two large quantities whose difference is to be taken.

"When one reflects on the very artificial nature of the whole longitudinal strength calculation, the assumed proportions of the wave, the assumed static balancing of the ship on the wave and the calculation of stresses by the beam formula, it is apparent that no great degree of precision is justifiable in calculating small changes in bending moment. The proposed formula is therefore recommended for all cases where the added weights are only a small percentage of the vessel's displacement, especially when it is desired that not much time be used in the calculation."

(4) Investigation of Structural Characteristics of Destroyers Preston and Bruce

By Commander C. O. Kell, U. S. Navy

Part II. Analysis of Data and Results

This is a report of the data and results from the experimental testing of the two destroyers named. A description of the tests and the methods used was given in the first part of the paper, presented at the 1931 meeting.

After describing very fully the methods of analysis, and discussing the results, the author concludes as follows:

"In interpreting the data obtained in these tests, it is necessary to bear in mind that they were static tests, and that no dynamic forces, such as the ship experiences in a seaway, were represented. Further, it was not possible to represent the torsional forces to which a ship at sea is subjected. Whether or not the ships' structures would function at sea as they did in these tests is the question remaining to be answered. It is possible that the results obtained by Dr. G. Schnadel and his associates in their successful investigations on the M.S. San Francisco answer this. It will be remembered that they also found all continuous structure effective in the formation of the section moduli, and no allowance was made for rivet holes.

"The non-representation of torsional forces is of importance, because, had it been possible to introduce such forces along with bending, no doubt a different stress distribution would have been found, and perhaps weaknesses in shear other than wrinkling of plating would have been found.

"The detailed stress measurements show that the simple beam theory can be used with accuracy in predicting stress in the ship's structure in design work. This is particularly true of longitudinal stresses resulting from bending in sag and hog. There remain some things to explain in the distribution of shear stresses, although it has been found that shear stresses calculated by the approximate formula are on the safe side. It yet remains to be determined what the function is of longitudinals, machinery foundations, platform decks and transverse bulkheads in carrying a part of the shear load. The disagreement between measured shearing stresses and theoretical stresses calculated by the complete formulæ (6) is not explained.

"In further discussion of the distribution of shear stresses found in both tests, I refer to Dr. J. Lockwood Taylor's paper on the subject, published in 1924. In stations where theoretical shearing forces were zero, finite shearing stresses were measured in the shell of the ships, but these stresses were so small as to make their correct value questionable, because of possible error in measurement. They were not plotted for this reason.

"The data clear up all questions that were raised over the results of the Wolfe tests with reference to disagreement of theoretical and observed deflections, the modulus of the structure and what structure should be included in the calculation of section moduli. The data show that all continuous structure, and that with reasonable fore and aft length, are effective, and no allowance need be made for rivet holes. Because of the light construction of these destroyers, it is believed that the same practice should hold for ships with heavier scantlings, if the plating be properly supported. The modulus of the structure was found to be that of the material. It is, however, questionable whether or not a modulus of structure equal to that of steel can be accepted for ships having heavier plating, unless the butts of longitudinal strength members and those of the shell plating are welded.

"The details of the failures and stresses at failure can be accepted as applicable only to the design of these destroyers. The weakness of both the deck and bottom structure when loaded in compression and the effect of discontinuity of structure were found. Instability of structure because of inadequate support was the cause of failure in each case. In addition to the need of adequate stiffening for plating, the questions of the rigidity of the stiffeners themselves, their stability under compression and the importance of details of connections of the stiffeners to the plating which they support were clearly brought out by the tests."

(5) The David W. Taylor Model Basin, Part II

By Captain Harold E. Saunders

Captain Saunders is presenting to the Society several papers describing the new ship model basin of the United States Navy at Carderock, Maryland. At the 1938 meeting he described the design of this basin, which was then under construction. The buildings and the installation of services were completed on June 26, 1939. Water had been admitted to the basins in January of 1939, and in March of that year the force from the Washington Navy Yard began preliminary work for laying the tracks for the towing bridges. This work continued to the summer of 1940, when the installation of the testing machines in the laboratory building was completed.

In October, 1940, the David W. Taylor Model Basin was placed in full commission, and henceforward will be the principal U. S. Navy ship model testing laboratory, with the Washington Basin kept in operation as an auxiliary plant.

In the rigidity of its concrete foundations, the alignment and leveling of its tracks for the towing carriages, the design and construction of its basin walls, and the design and construction of its towing carriages, this new model basin is superior to any of its predecessors in Europe or America. It should before long be providing naval architects with much very valuable basic design data.

(Page 55, please)

S. S. President Jackson First of New Round-

For American

President Jackson under Golden Gate Bridge, entering home port

The new round-the-world cargo and passenger liner President Jackson cleared New York on November 2 on her maiden voyage under the house flag of the American President Lines, and arrived in San Francisco on November 18.

This steamer is the first of seven identical sister ships building for the U. S. Maritime Commission at the Newport News Shipbuilding and Dry Dock Company's yard, Newport News, Virginia, and all allocated to the American President Lines' round-the-world service. The names and estimated delivery dates of the other six vessels are: President Monroe, December 20, 1940; President Hayes, February 20, 1941; President Garfield, April 10, 1941; President Adams, June 10, 1941; President Van Buren, August 8, 1941; and President Polk, October 10, 1941.

These new liners will replace seven cargo and passenger steamers built in 1920, and it is interesting to compare the principal physical and operating characteristics of the new and old types, because this comparison gives a very good idea of the progress made in ship and propulsion machinery design.

Physical characteristics are shown in the table herewith. It will be noted that, as compared with the old ships, the new vessels are: shorter, of greater beam, of greater depth but of shallower draft, of greater power, of greater speed and of less cargo capacity.

Comparing the propulsion plants, we have: in the old steamers, twin screws each driven by a direct-connected, four-cylinder, triple expansion reciprocating steam engine working on steam at 225 lbs. psi generated in 6 Scotch-type cylindrical fire-tube marine boilers; and in the new liners, a single screw driven through double reduction gears by a compound steam turbine working on steam at 450 lbs. psi generated in 2 modern marine-type water tube boilers. The old plant requires a large boiler room and an engine room, while the new plant, boilers and all, is housed in the engine room. Both plants burn fuel oil; the old plant at the rate of approximately 75 tons a day for 14 knots speed, and the new plant at the rate of 58 tons a day to drive the ship at 16½ knots sea speed.

Higher speed in the new plants cuts the total round-the-world schedule time (visiting 23 ports) from 112 days to 98 days, and allows longer stays in ports. Thus each ship on each round-the-world voyage will save 14 days ship's time and 2,136 tons of fuel.

World Liners

President Lines Service

Bow view of President Jackson

It is rather interesting that this new design has a large, slow-speed, solid four-bladed propeller operating at 85 rpm, while the old ships being displaced have twin screws of the three-bladed built-up type operating at 105 rpm.

Also of great interest, as illustrating the increased demand for service and comfort on passenger vessels, is a comparison of the electric auxiliary power features. On the old ships, all engine room auxiliaries and all deck machinery were operated by steam. In the new ships, all deck machinery and nearly all engine room auxiliaries are electric motor drive. Three small 50-kw turbine drive generating sets took care of the lighting and cooking load in the old vessels. For the increased power, lighting and cooking load in the new vessels, two 300-kw turbo generating sets are required.

Hull Characteristics

As with all Maritime Commission vessels, these liners are designed and built to comply with all the governing rules and regulations of the American Bureau of Shipping, the United States Bureau of Marine Inspection and Navigation, the Convention for Safety of Life at Sea, and Senate Report No. 184.

The hulls are subdivided into 8 watertight compartments by 7 watertight bulkheads. Forward and after peak bulkheads are carried watertight to the shelter deck. All intermediate bulkheads are watertight to the second deck. A tonnage hatch is fitted in the shelter deck, and tonnage openings in all shelter deck intermediate bulkheads. Double bottoms extend from the forepeak bulkhead to within 50 feet of the stern frame. The arrangement exceeds in stability and buoyancy the one-compartment floodability standard for a vessel of this size.

**ROUND-THE-WORLD LINERS
PRINCIPAL CHARACTERISTICS COMPARED**

	Old Ships	*New Ships*
Length O. A.	522′ 5″	492′ 0″
Length B. P.	502′ 0″	465′ 0″
Beam molded	62′ 0″	69′ 6″
Depth molded	42′ 0″	42′ 6″
Draft loaded	31′6″	26′ 6″
Displacement loaded	20,500 tons	16,190 tons
Gross measurement	10,500 tons	8,000 tons
Net measurement	6,200 tons	4,770 tons
Bale capacity	465,940 cu. ft.	454,050 cu. ft.
Refrigerated cargo capacity	52,300 cu. ft.	60,000 cu. ft.
Refrigerated ship's stores	5,300 cu. ft.	6,300 cu. ft.
Passenger capacity	76*	96
Crew complement	115	110
Propulsion power	7,000 bhp	8,500 shp
Sea speed loaded	14 knots	16½ knots
Fuel capacity	3,550 tons	1,455 tons
Cruising radius	15,000 miles	10,000 miles
Auxiliary electric power	150 kw	600 kw
Propeller speed	105 rpm	85 rpm

*This comparison is based on the older ships as built by the Shipping Board. These vessels were later altered by the Dollar Lines for larger passenger capacity.

Passenger Accommodations

President Jackson's sleeping accommodations for 96 passengers are arranged in: six single-bed staterooms and two rooms for three each on the promenade deck; and six rooms for two each and twenty-four rooms for three each on the shelter deck. The three-person rooms have two single beds and a pullman berth. All staterooms have private toilet, a lavatory and a tub bath and/or a shower.

As will be noted in the illustrations herewith, these staterooms: have ample floor area for comfort; are very nicely finished in metal-clad Marinite; are luxuriously carpeted and furnished; and have a profusion of electric light fixtures of either the indirect or lumiere types. Ventilation is perfect. Each passenger has a large clothes locker of the built-in flush-wall type. The air ports are large, and furnish ample fresh air when the ship is going ahead at her normal speed. Plenty of hot or cold fresh water is available at the turn of a tap. In short, here are first-class hotel standards and service.

The closely-grouped public rooms on the promenade deck are much more spacious than one would imagine from the

Veranda cafe and bar

arrangement plans of the ship. The main lounge or hall is two decks in height, flanked on each side by four vertical ventilating ducts. The center space between ducts on each side is closed by a fernery. The two end spaces on each side are open. On the port side, these openings lead into the cocktail lounge and bar, and on the starboard side, into the writing room and library.

The forward end of the lounge is decorated by a large mural painting over a fireplace and mantel. The after end is a huge curved window extending the full height and covered with venetian blinds and drapes. This window almost makes the room a solarium. It gives a fine view of the sports deck, the swimming pool and the sea. The windows in the two side rooms also support venetian blind treatment. The windows are by Kearfott.

A fine broad promenade deck outside these rooms is glass-enclosed with Kearfott Fulvu windows for the forward 50 feet port and starboard.

The dining room, pantry and galley are amidships on the 2nd deck. These three spaces are completely air conditioned. They have no outside air ports or any chance for natural light or air. We made the trip up from Los Angeles to San Francisco on the President Jackson, and wish to pay tribute to the designers and engi-

Main lounge

neers who arranged the ventilation, air conditioning and illumination of these spaces and the decoration of the dining room. The illusion of great spaciousness, and the actual freshness of the atmosphere, are perfect. We have never been in a dining room on any ship or in any hotel where the objectionable odors of cooking and of food were so completely eliminated.

A very simple and effective decorative device changes the appearance of the dining room from a long, narrow rectangle to a spacious, square compartment.

Furniture of Public Rooms

Throughout the public spaces, the filling of all upholstered pieces and all loose cushions are made of Dunlopillo latex cushioning.

The library, which is one of the rooms entered from the foyer, is paneled in light rift oak. This paneling is ⅞ inch thick and has a core of "Marinite," an incombustible asbestos composition. The rift oak veneers are applied to the face of this core by Sloane's Permo-Weld process. The exposed wood parts of all furniture in this room match the paneling. Along one wall is a sofa with end tables attached at each end, forming a single unit. This sofa is covered with a blue chevron frieze, and has three reversible loose cushions. The end table tops are of dark brown blister-proof material. The same fabric as is used on the sofa is also used on the open armchairs.

Below: Promenade deck lobby

Above: Shelter deck lobby and purser's office.

In the library there are also two easy chairs upholstered with a gold fabric of a diagonal weave, and two barrel-shaped easy chairs in a soft light blue leather.

Off the library is the card room. Sofas are of the same design as the sofa in the library, except that the wood is walnut and the covering a heavy cotton weave with stripes of varying widths of gold, brown and beige. Here in the card room the furniture is walnut bleached a medium color. The easy chairs and the open arm chairs are in chocolate brown mohair, as are the high back chairs set against the wall.

The hall is the largest of the public spaces. At one end is a fireplace, and on either side is a console cabinet. The top and base of the cabinets are walnut. The front and sides are covered in tan leather and divided into panels decorated with hand-painted decorations. Separating the hall from the card room are ferneries, also of walnut, and covered with leather which has been framed in by tooling with parallel lines.

The easy chairs in the hall are of two designs. Some are covered with light brown fabrics of a mottled pattern. Others are of a barrel type in plain gold

mohair, and similar in design to the settees. These settees have rounded ends and backs of uniform height and are covered in brown mohair.

Along the side of the cocktail room is a series of gray-green leather-covered benches forming a series of booths. The dado which is part of the unit is of silver finished primavera. The chairs in this room consist of two barrel type easy chairs upholstered with modern textured fabric, black and white figured on a reddish brown ground. The open armchairs are bleached walnut with full top grain venetian red leather. Several coffee tables, both rectangular and round, with rounded legs and corners, complete the furniture requirements in this room.

All of the above furnishings were supplied by W. & J. Sloane.

Typical three-passenger stateroom. Note pullman-type berth on bulkhead at left

Fire Protection

For the detection and extinguishing of fire in the cargo compartments and the machinery spaces, there is installed a Walter Kidde & Company Richaudio smoke and fire detection system combined with a Walter Kidde & Company Lux CO_2 fire extinguishing system. An adequate supply of gas masks and oxygen-breathing apparatus is carried for fire fighting and rescue purposes.

The smoke detection system continuously samples the air from all cargo spaces, including fourteen refrigerated compartments. The main fire extinguishing system employs 103 50-lb.-capacity carbon dioxide cylinders to protect cargo and machinery spaces, paint and lamp lockers. A separate Lux System of five 50-lb.-capacity cylinders is installed to protect the emergency generator room. Also, there is a centrally-located Lux hose reel with 75 feet of hose connected with two 50-lb.-capacity cylinders for protection of boiler room and engine room.

Enclosed section of promenade deck set for afternoon tea. Windows are Kearfott Fulvu.

All quarters and passenger accommodations are separated into zones by fire doors, of which there are forty-five manually operated and nineteen operated from a central control.

Zonit fire detection thermostats in passenger accommodations and crew's quarters, and a Zonit cabinet in the enclosed navigating bridge, give instant alarm to and locate fire danger for the officer on watch. The Zonit system was installed by Walter Kidde & Company, Inc.

All furniture is built of fire-resistant and fireproof materials, and all partitions are of Johns-Manville Marinite. A Walter Kidde & Company automatic fire-detecting and fire alarm system covers all quarters and all passenger accommodations.

Hydrants and hose reels kept under pressure by powerful fire pumps, and an adequate supply of portable chemical extinguishers strategically located, combine to make the President Jackson and her sisters as safe as engineering can make ships against the dangers of fire at sea.

Navigation Equipment

Radio communication to and from President Jackson is maintained by Mackay Radio and Telegraph Company equipment of sufficient power to keep her in constant touch with the operating office

S. S. President Jackson presents very "sweet lines" in the quartering bow view

of the American President Lines in San Francisco. This equipment includes: a Type 155-A main transmitter; a Type 156-A high-frequency (short wave) transmitter; a Type 149-A emergency transmitter; a Type 117-A all-wave receiver; a Type 122-B stand-by receiver; and a Type 123-B crystal receiver.

The radio direction finder was supplied by Bludworth.

Azimuth circles, pelorous, Navy standard binnacle, spherical compasses and standard compasses are from T. S. and J. D. Negus.

Gyro master compass and repeaters, gyro pilot and course recorder, were installed by the Sperry Gyroscope Company.

The A. Lietz Company of San Francisco supplied an electric drive rotary brake sounding machine.

The mechanical engine order telegraphs, the helm angle indicator and the tell-tale running light panel are of Bendix manufacture.

The Submarine Signal Company supplied a Fathometer, automatic echo-sounding device.

Refrigeration

There are 14 refrigerated cargo chambers. Three of these, with a total capacity of approximately 10,000 cubic feet, are fitted with wall and ceiling coils, cold air diffusers and air recirculation, and are capable of maintaining 0° F. temperature. The other eleven, with a combined capacity approximating 44,000 cubic feet, are fitted with cold air diffusers and air recirculation only, and are capable of holding the temperature at 25° F. For ship service stores, there are seven chambers, with a combined capacity of 12,795 cubic feet, and with maintainable temperatures ranging from 20° F. to 50° F.

The dining room and certain other compartments are air conditioned under the Carrier "Weather Maker" system, with complete temperature and humidity control. The complete refrigerating and air conditioning installation was by the Carrier Corporation. All of the refrigerating machinery is on the direct-expansion system, using Freon-12 as a refrigerant. There are: eighteen Carrier (7H5) compressors, each with a 7½-ton refrigerating capacity at 40° suction temperature; one scuttle butt with a capacity for 40-gallon storage and for cooling 10 gph to 25° F.; and one ice maker with a capacity for 400 pounds per day.

Deck Machinery

The electro-hydraulic steering gear is of the Lidgerwood double-ram link type having two double-acting rams and four cylinders. These cylinders are actuated by either one of two variable-delivery hydraulic pumps, each of which is driven by a Westinghouse 50-hp motor. Each pump and its motor forms a complete system for working the gear, which is capable of operating the rudder from hard over to hard over in 30 seconds with the ship at full speed ahead, or in 60 seconds with the ship at full speed astern.

Steering gear control is of the follow-up type, with both Lidgerwood hydraulic and Sperry electric telemotor systems. The Sperry gyro pilot is installed.

The windlass is of the Lidgerwood horizontal spur gear type, having two wildcats with locking and driving heads and two whelpless gypsey heads on the wildcat shaft.

It is mounted on the forecastle head, and driven by a 70-hp Westinghouse motor equipped with a solenoid brake. This windlass will raise both 11,340-pound anchors from a depth of 30 fathoms at a speed of 30 fpm. The anchor chain is Naco stud link-cast steel chain, supplied by the National Malleable and Steel Casting Co., who also supplied the anchors. Thirty fathoms would weigh approximately 8500 lbs., so that the total weight on the wildcats at that depth would be over 31,000 lbs.

The warping capstan, located on the shelter deck aft, is of the Lidgerwood vertical shaft type, driven through spur and worm gearing by a 50-hp Westinghouse motor located on the second deck. It will handle a warping load of 29,000 lbs. at 30 fpm, or a load of 2500 lbs. at 75 fpm rope speed.

The radio equipment is very complete, both for communication and for ship broadcasts

For cargo handling, sixteen cargo winches are provided. These are all of the American Hoist and Derrick single-drum type, with drums 22 inches in diameter and 20 inches long, and gypsey heads 18" x 20" on the drum shafts. They are double spur geared, 2-speed type, each driven by a 50 hp. Westinghouse motor and each capable of handling a single line load of 3720 lbs. at 330 fpm or 7450 lbs. at 250 fpm. Two of the winches are fitted with additional gearing so that they can be adjusted to handle also a single line load of 14,430 lbs. at 105 fpm.

Propulsion Machinery

The main propulsion unit consists of a Newport News Shipbuilding and Dry Dock Company cross-compound turbine receiving steam at 440 psi gage pressure and 740° F. total temperature from two sectional header type Babcock & Wilcox marine water tube boilers, and driving the single propeller shaft through Westinghouse double-reduction gears.

The turbine unit is rated at 8500 shp on the above steam conditions with 28½ inches vacuum at the condenser and with high-pressure turbine rotor revolving 4504 rpm and low-pressure rotor revolving 2289 rpm. At these speeds for the turbine rotors, the propeller shaft turns at 85 rpm.

At 8500 shp the ship must maintain 16½ knots speed; the turbine is guaranteed to maintain a water rate of not over 6.97 lbs. per shp hour; and the combination of boiler and turbine is guaranteed to maintain an overall fuel consumption not exceeding 0.60 lbs. per shp hour of fuel oil containing 18,500 Btu per pound.

The propeller is a right-handed, four-bladed, solid-cast manganese bronze wheel furnished by the Cramp Brass & Iron Foundries. Measurements of this wheel form an interesting combination of twenty-one's. It has a diameter of 21 feet 8 inches; at 0.7 of the radius its expanding pitch measures 21 feet 8 inches; its mean width ratio is 0.216; and it weighs 21 tons.

A six-shoe segmental type thrust bearing, supplied by the Howarth Pivoted Bearings Company, is installed on an extension of the low-speed gear shaft just forward of the casing for that gear.

The boilers are of the well-known Babcock & Wilcox sectional header marine water tube type, with convection type superheaters, drum coil desuperheaters and straight tube air preheaters incorporated in the design. This boiler is designed for a working pressure of 500 psi.

At normal operation, the evaporative rate of each boiler is 37,500 lbs. per hour of steam, which registers 450 psi gage pressure and 750° F. total temperature at the superheater outlet. The efficiency under these conditions is 87 per cent. Each boiler is capable of 50 per cent evaporative overload, or 56,250 pounds of steam per hour at 450 psi and 750° F.

Five fuel oil burners are installed in each boiler. These are of the Babcock & Wilcox wide-range type. Fuel oil is supplied to the burners by a Quimby screw type, motor-drive oil pump. This pump takes oil at 100° F. from the fuel oil service tanks and discharges at 300-lb. pressure into an oil main leading to three Griscom-Russell oil heaters, which raise the temperature of the oil to 230° F. From these heaters the oil goes to the burner manifold. A Buffalo Meter Company meter measures the fuel oil used on each boiler. A steam drive 6½" x 3½" x 12" direct-acting Worthington vertical simplex pump is installed for auxiliary fuel oil service. Each of the three oil heaters has capacity to heat 6000 pounds of oil per hour from 100° to 230° F.

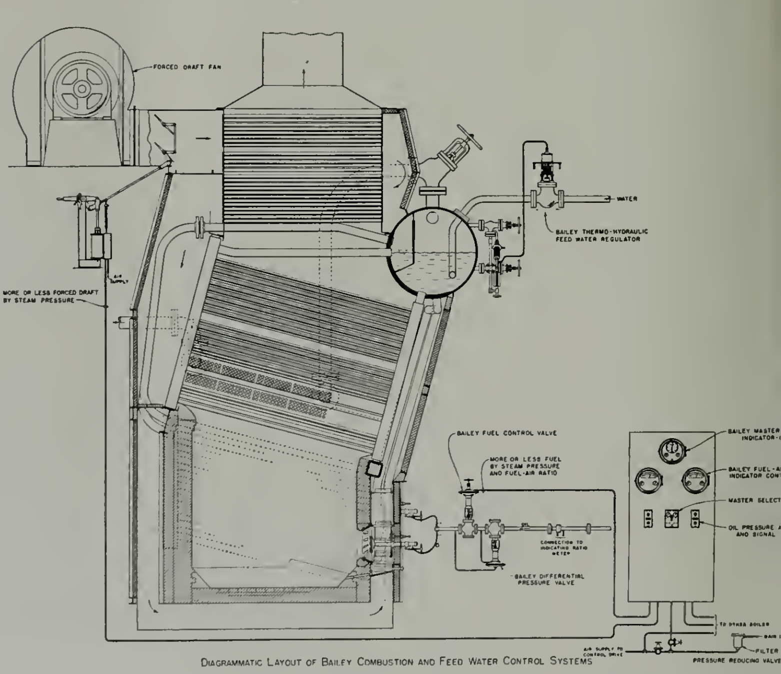
Two Sturtevant force-draft blowers driven by Westinghouse motors supply combustion air to the burners at the rates of 12,000 cfm at 6.0" for normal full load and of 18,000 cfm at 14.5" for the maximum overload condition. This air is fed down to the burners through the air preheaters and through the space between the inner and outer casings of the boilers.

Combustion Control

The Bailey Combustion control equipment aboard the President Jackson is arranged as shown diagrammatically in the illustration. This diagram shows both combustion control and feed water control, which are installed aboard this ship.

The combustion control system automatically maintains steam pressure and distributes the load between boilers. It also automatically readjusts the fuel-air ratio to insure ideal combustion conditions in everyday operation. Fuel-air ratio is constantly measured by the Bailey Fuel-Air Ratio Indicator-Controllers, one of which is installed on each boiler. Through these controllers, this all-important factor which determines fuel economy is continuously monitored and instantly readjusted when necessary.

Both fuel and air are controlled simultaneously in accordance with changes in load as measured by slight variations in steam pressure. The fuel flow to the straight mechanical oil burners is readjusted to maintain the most economical fuel-air ratio at all times. A system of oil pressure alarms and signal lights warns operators when it is necessary to put on or



Diagrammatic Layout of Bailey Combustion and Feed Water Control Systems

take off additional oil burners in order to maintain operation always within the controllable range of the burners.

The control system operates on compressed air at a pressure of approximately 35 pounds per square inch, and includes a selector valve, which enables the operators to place the boilers on remote manual control from the boiler panel if desired.

Bailey Feed Water Control of the thermo-hydraulic type regulates the flow of feed water to the boilers in accordance with the rate of steam output as reflected by slight variations in boiler water level. These regulators are self-contained, employing their own thermo-hydraulic system for the automatic regulation of the feed water control valve.

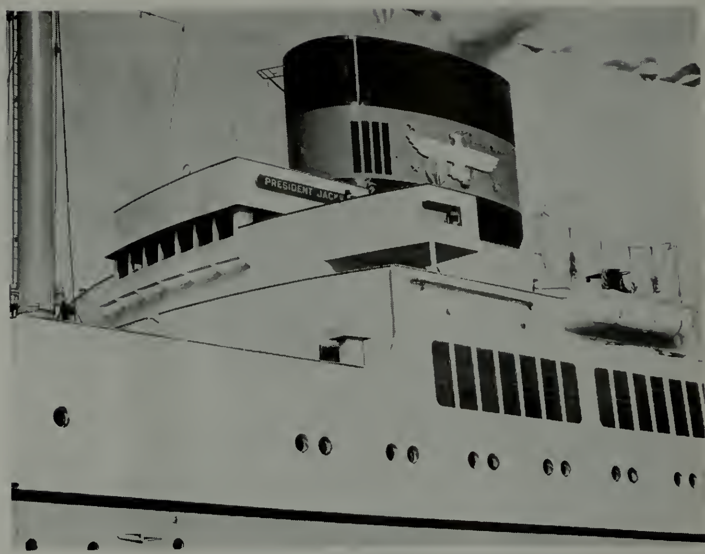
Diamond soot blowers keep the heating surfaces of the boilers clean, and a flue gas analysis outfit furnished by the Hays Corportion is used to check the completeness of combustion. A Hancock injector takes care of filling these boilers with water when necessary.

The boilers are mounted just forward of and in the same compartment as the turbines, and a short main steam line connects the drums of the two boilers to the turbine throttle. The entire propulsion machinery space for 8500 normal horsepower occupies only 50 feet of the length of the hull, and allows ample space for all auxiliaries, a spacious dynamo flat and a large machine tool room.

The main turbines are of the combined impulse and reaction types, designed and built by the Newport News Shipbuilding and Dry Dock Company, and having an astern turbine incorporated within the casing of the low-pressure ahead turbine. The main throttle valves and the governors are of Newport News design and make. The shafts of the high-pressure and low-pressure rotors are directly connected through flexible couplings to the shafts of the high-speed pinions of a Westinghouse double-reduction gear.

Steam from these turbines is exhausted directly into a condenser directly below the turbines. This condenser is of the two-pass type, designed and built by the Newport News Shipbuilding and Dry Dock Company, and has 7800 square feet of cooling surface. It is rated at 53,700 pounds of exhaust steam per hour on normal operation at 28½" vacuum, 75° F. entering temperature of cooling water, 7 feet per second cooling water velocity and 85 per cent clean tube factor.

The condenser is served by a C. H. Wheeler Co. twin two-stage type air ejector with inter and after and gland leak-off condensers. When maintaining a 28½"



Bridge and stack of President Jackson

vacuum, and supplied with 250 psi steam, this ejector is capable of removing in each hour 41 pounds of dry air or 130 pounds of air and vapor.

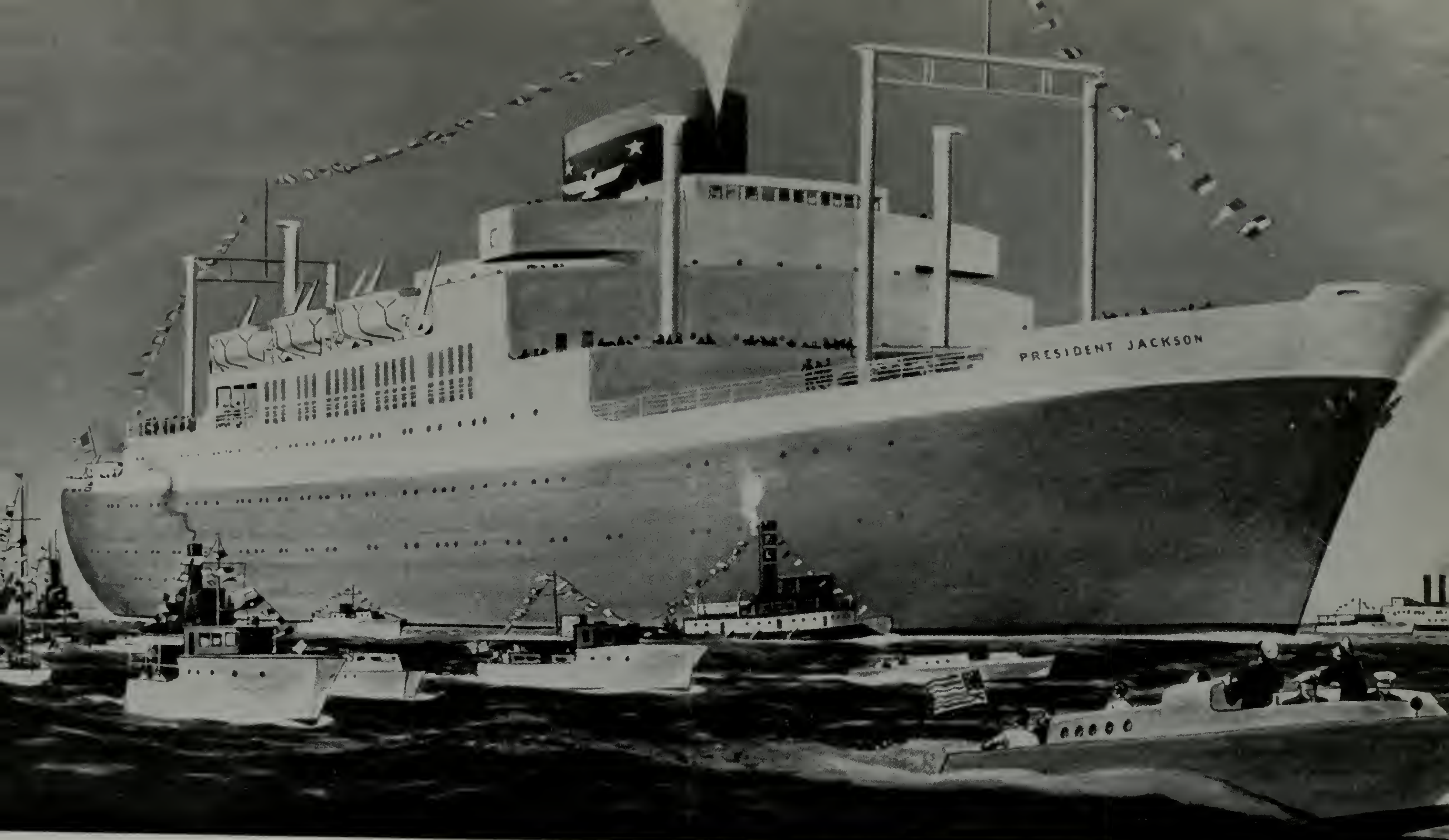
Circulating water is provided by a De Laval horizontal type centrifugal pump driven by a 100-hp Westinghouse motor and having a capacity of 13,000 gpm at 10 lbs. pressure.

Two Worthington vertical centrifugal pumps, each having a capacity of 140 gpm at 180 feet head, and each driven by a 15-hp Westinghouse motor, take care of the condensate. These pumps draw from the condenser hot well and discharge through: the inter and after and gland leak-off condensers of the ejector, and thence to the drain cooler, and then to the first-stage feed water heater and the deaerating feed water heater. The drain cooler has a drain capacity of 4500 lbs. per hour and a feed capacity of 64,000 lbs. per hour of 100° F. feed. The first-stage heater will raise 64,000 lbs. per hour of feed water from 100° F. to 172° F., using exhaust steam at 7.5 psi absolute. Drain cooler and first-stage heater are by Davis Engineering Co. When provided with bled steam at 25 psi absolute, the Cochrane deaerating heater will heat 76,000 pounds of feed per hour from 172° F. to 240° F. This deaerating heater has a storage capacity of 1250 gallons, and, being located on the shelter deck level approximately 36 feet above the engine room floor, it acts as a positive priming head for the feed pump suction.

There are duplicate main feed pump units. Each consists of a Warren horizontal centrifugal pump driven by a Terry turbine and having a capacity to deliver 2000 gpm at 600 psi. These pumps take feed from the deaerating heater and deliver it to the boilers through the Davis third-stage heater, which is served with steam at 100 psi absolute, and raises the feed from 240° F. to 318° F. at the rate of 76,000 lbs. per hour.

A gravity lubricating oil system takes care of the turbine-reduction-gear units. The gravity tanks are located high enough to provide 10 lbs. pressure on the highest bearings. From these tanks oil flows to the bearings, and from the bearings to a sump under the turbines. From this sump it is pumped by two Quimby rotary motor-driven pumps through two Griscom-Russell oil coolers, each having a capacity for cooling 310 gpm of oil from 135° F. to 110° F., and back to the gravity tank.

The lube oil purifying system is arranged for either batch or continuous purification. Purification is accomplished in either case by a Sharples centrifuge with a capacity for 350 gpm. It is served by a Griscom-Russell heater which is designed to raise that amount of oil from 110° F. to 150° F. In continuous purification, oil is drawn from the sump tank, and goes through heater and centrifuge



S. S. PRESIDENT JACKSON, FIRST OF THE SEVEN NEW ROUND-WORLD AMERICAN PRESIDENT LINERS

THE LUXURIOUS DINING SALOON aboard the *S.S. President Jackson,* alike in dimensions with her six sister ships, is individually designed and decorated in the above manner. These seven 23 ft. by 55 ft. saloons are all air-conditioned. Whether the vessels are in the tropics or a temperate winter, they remain a standard for dining comfort.

The modern equipment o will make it possible for the luxury of fresh fruits a America, whether they are Passengers may add to the standbys a series of new globe travelled chefs are ducing. Indian curry at

and back to sump. In batch purification, oil is pumped from the sump to a settling tank, where it is allowed to settle before going through the centrifuge and back to the sump or to the storage tank.

In order to prevent any contamination of the feed-water system for the main boilers, all steam for heating the quarters and for the heating coils in the fuel oil tanks is generated in a Davis Engineering Company evaporator which has a capacity to convert 13,000 pounds of water per hour into steam at 50 psi when supplied with desuperheated steam at 185 psi.

There is installed a make-up feed evaporator which evaporates 1500 pounds of water per hour to steam at 15 psi when supplied with bled steam at 85 psi. The salt water evaporator and distiller have a combined capacity for 6000 gallons of distilled water per day. Both evaporators and the distiller were supplied by Griscom-Russell.

An interesting item in the engine room equipment is the oil and water separator made by the Condenser Service and Engineering Company. This device will separate the oil from 50 tons of water per hour.

Machine Tool Equipment

The machine shop equipment includes:

One American Tool Works 18″ x 54″ engine lathe driven by 7½-hp Electro-Dynamic motor.

One Steptoe 24″ shaper driven by a 7½-hp. Electro-Dynamic motor.

One Cincinnati Electric Tool Co. 20″ drill press driven by a 1-hp General Electric motor.

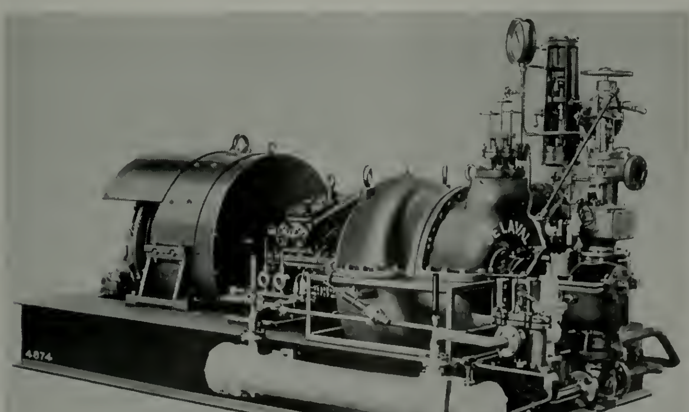
One Champion Blower & Forge Co. 12″ x 12″ x 2″ wet and dry grinder driven by a 2-hp General Electric motor.

Auxiliary Power

The electric power and light plant consists of three 300-kw, three-wire, compound-wound, 120/240-volt, direct-current Westinghouse generators each driven through reduction gearing by a De Laval steam turbire. The turbines operate on full steam pressure, and exhaust into a Newport News 640-sq.-ft. heating surface condenser at 28½ inches vacuum. Under these conditions, a water rate of 14.25 pounds per kw hour is guaranteed at full load operation.

Practically all auxiliaries are electric-motor-drive, the exceptions being the steam turbine drive main and auxiliary feed pumps, and the steam reciprocating drive; port feed pump; contaminated, salt water and make-up evaporators feed pumps; and auxiliary fuel oil service pump. The total connected electric load in motors, cooking and lighting approximates 2500 horsepower.

As is required in American marine practice, an emergency generating set is installed. On these new round-the-world liners, this set is installed in the dummy part of the stack at the level of the top of the bridge house. It consists of a Westinghouse 120/240-volt generator driven by a Superior diesel engine and floating on a storage battery interconnected with the main generator circuits in such fashion that whenever the main generator voltage drops more than 20 per cent the emergency generating set will start automatically, and all emergency circuits will be automatically transferred to the emergency generator. These emergency circuits cover the lighting for navigation, machinery spaces, binnacles, radio equip-



Westinghouse generator driven by De Laval turbine as installed on S. S. President Jackson

Cochrane deaerating heater

ment, emergency power station, passageways, stairways, exits from quarters, boat stations and side flood lights.

The switchboard was built and installed by the Newport News Shipbuilding and Dry Dock Company.

Performance

The propulsion plant on this ship operates with remarkable smoothness, and although the turbines have never yet been fully opened up to their capacity, they have driven the hull through the water at better than 20 knots speed.

At normal horsepower and propeller speed, the hull, designed for 16.5 knots, travels through calm seas at nearly 18 knots. At 19.5 knots, there is no sign of vibration on deck, nor can the ear detect the slightest sign of noise or hum from the machinery.

The owners, the builders and the designers are to be congratulated on such a splendid product—a combination liner setting new standards of economy in operation and passenger comfort.

Pilot house

M. S. Shooting Star

Second C-2 Built by Tampa,

On February 8, 1851, there was launched from the yard of James O. Curtis at Medford, Massachusetts, a beautifully-modeled clipper ship for Reed, Wade & Co. of Boston. Designed by Captain John Wade, this hull had a keel length of 154 feet, a deck length of 164 feet and a length overall of 171 feet, with a beam of 35 feet and a depth of hold of 18 feet 6 inches. On her sharp bow was a female figure draped in white garments encircled at the waist by a girdle of stars. She was named Shooting Star, and became one of the fastest of the small clippers.

She made six voyages outward bound from Atlantic Coast ports round the Horn. Four of these were to San Francisco; the other two to Hongkong. Her best time to San Francisco was 105 days, in 1852. Best time to Hongkong, 98 days, in 1856. Her most notable run was the homeward voyage in 1851-52 from Macao to Boston in 86 days. She frequently logged 14 knots.

In 1856 she entered the Asiatic coasting trade; and about 1860, after being damaged in a typhoon, she was sold to a Bangkok merchant and continued in the coasting trade under the Siamese flag. In 1867 she was lost on the coast of Formosa.

It is interesting to note, in passing, that at a speed of 14 knots the clipper Shooting Star was gathering free horsepower with her sails which would be the equivalent of approximately 3500 shaft horsepower applied through a propeller.

The name of this beautiful clipper ship is proudly borne today by the second of eight C-2 motor vessels building at the Tampa Shipbuilding Co. for the U. S. Maritime Commission. The modern Shooting Star held satisfactory trial runs on October 28 and 29 in the Gulf of Mexico off Tampa, Florida, and was delivered to her new owners, the U. S. Navy, shortly thereafter.

The Shooting Star is identical with the Sea Witch, described in the August issue of PACIFIC MARINE REVIEW. On her eight-hour endurance and fuel consumption test, the main engines developed 6300 shp

Delivered to Navy

Cargo Motorship Engined by Nordberg

Forward deck

and indicated a specific fuel consumption of 0.42 lbs. per shaft horsepower hour. On her two-hour 10 per cent overload run she developed 7175 shp.

At her normal shaft speed of 95 rpm, her hull traveled through the water at 17.75 knots, and on overload her maximum hull speed was 18.46 knots.

Her principal characteristics are given in the table herewith:

Characteristics

Length O. A.	459′ 0″
Length B. P.	435′ 0″
Beam molded	63′ 0″
Depth Molded, S. D.	40′ 6″
Draft loaded	25′ 9″
Deck height, 2nd—S. D.	9′ 0″
Deck height, 3rd—2nd	10′ 0″
Built weight	4,626 tons
Fuel oil	1,287 tons
Fresh water	246 tons
Crew and stores	28 tons
Cargo dwt capacity	7,713 tons
Total dwt capacity	9,274 tons
Displacement, loaded	13,900 tons
Gross measurement	6,222 tons
Net measurement	3,559 tons
Total bale cubic capacity	558,270 cu. ft.
Deep tank liquid cargo cap.	2,900 tons
Shaft hp, normal	6,000
Sustained sea speed, designed	15.5 knots
Cruising radius	12,500 miles

Propulsion Machinery

The power plant of S.S. Shooting Star and of her seven sisters is of the geared diesel type. Very briefly, it comprises two Nordberg diesel engines of the 2-cycle, single-acting, mechanical-injection, port-scavenging, cross-head type, each having 9 cylinders in line with 21-inch bore and 29-inch stroke. These engines, on their normal load, run 225 rpm, and each of them is connected through a Vulcan hydraulic coupling to a pinion meshing with the single gear of a Falk speed-reducing gear. The resulting output is 6000 horsepower on the propeller shaft at 92 rpm. Guarantees call for 0.43 lbs. of fuel per shp at full load, and for capacity to run under 110 per cent full load continuously, and under 125 per cent full load for two hours. The normal rating of each engine at 225 rpm is 3115 bhp, which allows for approximately 4 per cent loss through the coupling and gear, or an efficiency of 96 per cent from engine to propeller shaft.

Some of the principal details of this engine are described as follows by R. W. Bayerlein of the Nordberg Manufacturing Co.

The cylinder heads are of heat-treated alloy cast iron, symmetrical in design, having a central opening for the fuel-injection valve together with openings for air starting, relief and indicator valves. Fuel-injection valves are of the Bosch

A Modern Marine Diesel Engine Room

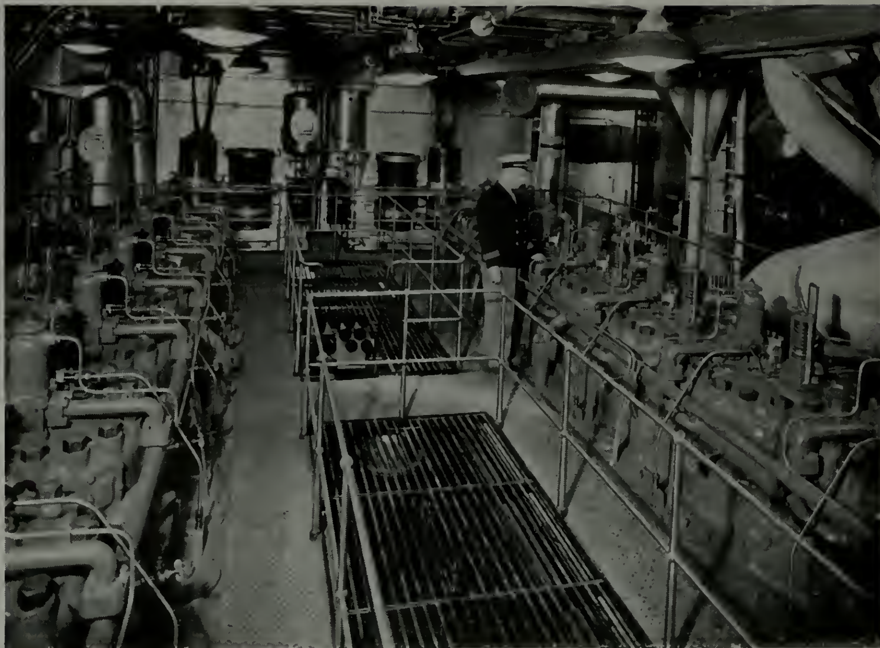
This clear photograph, taken on the lower grating of the engine room of M. S. Shooting Star, gives a clear view along the central aisle between the two Nordberg diesel engines of the 2-cycle, single-acting, mechanical injection, port scavenging, cross-head type. Each engine has nine cylinders with 21-inch bore and 29-inch stroke, and at normal full load speed of 225 rpm develops 3115 brake horsepower.

Each engine is connected to the single propeller shaft through a Vulcan hydraulic coupling and a Falk single-reduction mechanical gearing, which at full normal speed of the engines drives the propeller shaft at 95 rpm. In calm water, fully loaded, and at the normal rating of the engines, this propulsion unit on trials drove the hull at 17.75 knots.

Note the simplicity of the engines, the accessibility of the fuel pumps and lubricators, and the access to all reciprocating parts through doors in the side of the frame.

In the background can be seen one side of the control panel. All starting, reversing and maneuvering controls are located at this spot, and one engineer can with one set of easily-operated levers control both engines.

The consumption of fuel is less than 0.42 pounds per shaft horsepower hour for all purposes.



Upper grating of engine room on Shooting Star, showing heads of cylinders of twin Nordberg diesel engines

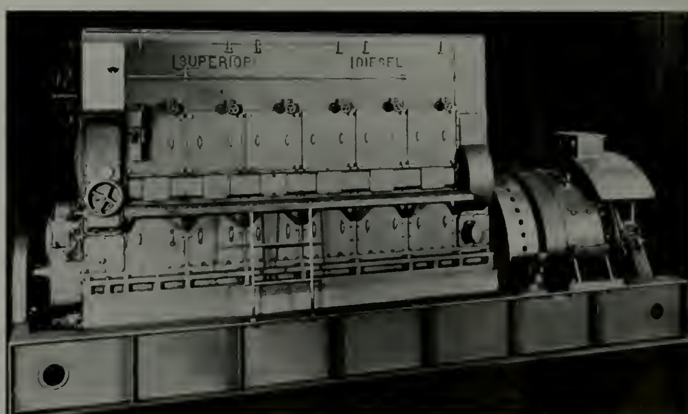
differential type, fitted with removable water-cooled nozzles and metal-edge fuel-oil filters. Starting valves are air operated, pilot-piston type, located in cages in each cylinder head. Cylinder relief valves are also located in cages.

The pistons are of two-piece construction. The head, of heat-treated alloy cast iron, is bolted directly to the trunk or skirt, which in turn is bolted to the crosshead body, thereby eliminating a piston rod. The head carries all piston rings, and contains the oil-cooling space.

Cooling oil is brought through the drilled connecting rod to the hollow crosshead pin, then out to one side through steel tubing to the piston head. Here the cooling oil must take a definite course through a spiral passage, and then leave the piston through another tube to the opposite side of the crosshead pin and out through a free-running telescopic pipe to the engine sump. Thus the cooling oil is forced through the piston head without employing any wearing parts.

The scavenging air is supplied at 2½ lb. per sq. in. gage pressure by a Roots type positive-displacement, two-lobe, rotary blower located at the aft end of each engine. The blower is driven from the crankshaft through a train of gears, the driving gear being mounted on the crankshaft with a torsionally flexible connection. Superimposed on each blower is a butterfly valve providing for uni-directional flow of air, irrespective of the direction of engine rotation. The butterfly valve is automatically brought into its proper position by the reversing mechanism. The air is discharged into a large header, running along the full length of the engine. In this header, and bolted to the cylinders, is a series of automatic non-return valves serving all of the scavenging ports. These valves make it impossible for exhaust gases to flow back into the scavenging header, thus preventing contamination of the fresh air supply.

The reversing gear fitted to these engines is an adaptation of the type built by Burmeister and Wain of Copenhagen, for whom Nordberg is the American licensee. Hand levers for engine control and reversing, together with the remote control for connecting and disconnecting the hydraulic couplings, are mounted at a central control stand, which is located at the forward end of the two engines near the gage boards. The reversing and control levers are interconnected to control the two engines with one set of levers, and provision is made to control the engines separately.



Steady as you go!

KNOWLEDGE IS THE STRAIGHT COURSE TO ADVANCEMENT

A Department for Deck Officers

by "The Skipper"

Questions Welcomed. Just Address "The Skipper," Pacific Marine Review, 500 Sansome Street, San Francisco, California

CARGO AND STOWAGE VI

QUESTION

Define the following: (a) grain; (b) grain-laden.

ANSWER

(a) The expression *grain* means any corn, rice, paddy, pulse, seeds, nuts or nut kernels.

(b) The expression *grain-laden* means loaded with a cargo of which the portion consisting of grain is more than one-third of the registered tonnage of the ship, and that third shall be computed, where the grain is reckoned in measures of capacity, at the rate of one hundred cubic feet for each ton of the registered tonnage; and where the grain is reckoned in measures of weight, at the rate of two tons weight for each ton of the registered tonnage.

QUESTION

What is a "Grain Certificate"?

ANSWER

A *grain certificate* is a document required to be filled in by the master, signed and delivered by him. The *grain certificate* contains the following information: The ship's name, port of registry, official number and registered tonnage; number of laid decks; draft and freeboard after completion of loading; kind, weight and quantity in cubic feet and bushels; method of stowage and precautions taken to prevent the grain from shifting.

QUESTION

How would you prepare the holds for grain in bulk?

ANSWER

Have the holds thoroughly washed out, if possible; if not, then thoroughly swept at least twice. On the last occasion, sprinkle damp sawdust about before sweeping; the sawdust prevents the dust from rising. Have the holds thoroughly dried and aired before erecting the shifting boards and feeders—the shifting boards to extend from ceiling to deck. Have the bilges and strums cleaned out and limewashed, calk all the limber boards, then cover them with burlap or separation cloths. Have the whole of the tank top, ceiling and limber boards well dunnaged, and the dunnage covered with separation mats or covers. All bare ironwork, etc., to be covered with mats or burlap.

Deck Officers' Licenses for October

Name and Grade	Class	Condition
PORTLAND		
L. S. Russell, Jr., 2nd Class Pilot	SS, any GT	O
SAN PEDRO		
H. E. O'Dell, 2nd Mate	SS, any GT	RG
J. F. Summerill, 2nd Mate	SS, any GT	RG
SEATTLE		
C. H. Salenjus, Master	SS, any GT	RG
L. L. Hughes, 2nd Mate	SS, any GT	O
SAN FRANCISCO		
H. W. Anderson, Master	SS & MS, any GT	RG
J. W. Home, Chief	SS, any GT	RG
S. J. MacKinnon, Chief	SS, any GT	RG
E. E. English, Chief	SS, any GT	RG
F. W. Gager, Chief	SS, any GT	RG
H. R. Odell, 2nd Mate	SS, any GT	O
G. J. Costello, 2nd Mate	SS, any GT	O
R. W. Lees, 2nd Mate	SS, any GT	RG
L. R. Dupuich, 2nd Mate	SS, any GT	RG
R. E. O'Laughlin, Jr., 2nd Mate	SS, any GT	RG
L. Slaton, 3d Mate	SS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license; RG is raise of grade. All of these licenses are for ocean service.

QUESTION

Why must a vessel carrying grain in bulk be fitted with feeders and shifting boards, and how are they constructed?

ANSWER

Grain when carried in bulk is very liable to shift, the angle of repose of a pile of grain being about 25 degrees, so that the rolling of a ship at sea is capable of setting it in motion.

When a ship not specially built for the purpose is required to load a cargo of grain in bulk, a temporary midship longitudinal bulkhead or shifting board must be constructed, extending from one end of the hold to the other, and from the bottom up to the deck. The bulkhead is made of deal planks laid fore and aft, edge on edge, so that it forms a boarded partition dividing the hold longitudinally into two parts. Some ships have the midship pillars staggered on alternate frames so that the planks may be rove between them.

A feeder is a grain-tight trunk-way built over the hatch of the lower hold between that hatchway and the one above it. It must hold from 2 per cent to 6 per cent of the total quantity which the compartment it feeds will hold. Feeders are constructed by placing some deals on end, reaching from hatchway to hatchway, and tomming them off from the ship's side, and generally backing them with grain in bags or cases of general cargo to keep them in position. Feeders must be cleated at head and foot, and have shifting boards extending, in the center, above the grain.

The most important thing as regards the stowage of a grain cargo in bulk is to see that it is well trimmed and that every

hold is thoroughly well filled. It is not sufficient to leave this to be done only by the trimmers, but every officer or person concerned should give the matter his own personal attention.

QUESTION

How would you stow grain in bags?

ANSWER

The stowage of grain in bags requires considerably more attention than that of grain in bulk. In all cases the ship must be thoroughly clean, holds dry, dunnage laid and all iron well covered. Care must be taken that no bags overlap beams, stringers or other such obstruction in the hold.

The tiers should be stowed fore and aft right across the vessel, but in the case of a ship that is close dunnaged, and perhaps matted in the sides, it is recommended, if convenient, that the bags in the wings be stowed athwartship, as this leaves only the end of the bag close to the ship's side, and only the end of the bag is liable to damage.

On all favorable opportunities, hatches should be opened and cargo examined; and if the weather is good, they should be left open during parts of the day. The hold ventilators also require careful attention at all times. Insufficient dunnage or lack of ventilation is undoubtedly "bad stowage."

QUESTION

What is meant by "bleeding bags," and would you advocate this procedure?

ANSWER

By "bleeding bags" is meant the opening of bags so that their contents are allowed to run into spaces left between the bags already stowed, and also between the ship's side and the edges of the stowed bags. Sometimes the bags are actually opened and emptied by the stevedores; at other times they are opened and then stowed so that the contents escape by themselves.

This procedure should never be advocated, because in most cases it impedes, and sometimes prevents, the proper ventilation of the cargo, this being a very important factor in the safe carriage of cargo.

QUESTION

What precautions must be taken when carrying a part cargo of guano?

ANSWER

Guano is the dung of seabirds, mainly collected from islands of the West Coast of South America and the Pacific Ocean. It contains phosphorus and ammonia, and is largely used in the manufacture of patent manures. If carried with other goods, great care should be taken to avoid damage to them. All foodstuffs must be kept in another hold, or the smell will injure them, and it will turn nuts and feathers, etc., black. In its turn it will be injured by contact with salt, nitrate of soda, etc. Guano is often carried in full cargoes. It needs no special stowage, but must be kept apart from nitrate of soda, which is also shipped from South American ports, and carefully protected from contact with salt water, but rain water does not seriously affect it. Vessels loaded with a full cargo of guano are usually battened down and ventilators closed after loading, and kept in this condition during the whole voyage.

QUESTION

What is the most important thing to watch out for when stowing hemp?

ANSWER

When stowing hemp, the most important thing to avoid is to keep clear of greases, oils, etc., as it is liable to spontaneous combustion if it has been in contact with such. If stowed with wool, dunnage must be placed between the hemp and wool. It is a dry, clean cargo, devoid of any objectionable properties, and is mostly employed for cloth and rope making, but a small quantity is used in pharmacy. Hemp is packed in bales, and when not carried in full cargoes, should be loaded in a dry condition, and given upper stowage if possible, well dunnaged and matted.

Manila hemp bales are bound with rattan canes, New Zealand with fiber rope, and sisal bales with wire.

QUESTION

How and where would you stow hides?

ANSWER

These are the undressed skins of cattle, horses and other large animals, which, when tanned and dressed, become leather. They are variously carried either in a dry condition, wet, or dry salted.

Dry hides are those that have been sun dried after having been treated with a special mixture. They are usually carried loose in bales, which should be given good stowage and never loaded among wet hides or moist goods.

Dry salted hides are those that have the salt rubbed into them before the treatment, and they are then packed in barrels, bags, or loose.

Raw hides from South America are sometimes salted into a vessel. The iron of bulkheads, stringers, etc., is first covered with wood, the raw hides laid flat with the hair underneath, and salt then sprinkled over them, then another layer of hides, and so on till the compartment is full.

Salted hides are often carried folded into square bundles stowed loose in a wet condition, and in this case should be stowed by themselves in a wet deck or in some place in the bottom of the vessel. Care must be taken to prevent their damaging other cargo, as a large quantity of brine will drain from them, and in cases where they have been piled at one end of a hold, as much as six inches of brine has been found on the ceiling in the other parts of the hold.

In every case, when carried loose or in bags, hides should be kept as flat as possible, and most carefully dunnaged and matted. All stanchions or any other iron, even hoops of casks, if not carefully covered, will seriously damage the hides. They may rot and become useless, and in any case, if at all marked, will result in heavy claims. This iron damage is very difficult to observe, and is sometimes imperceptible until the process of tanning is nearly completed. Chafing should also be avoided.

Owing to the objectionable pungency of green hides, these must not be carried in emigrant ships, and in other vessels they should be stowed away from foodstuffs and living quarters.

QUESTION

How should iron and steel be stowed?

ANSWER

For stowage purposes, these two articles may be taken together. They are shipped in many forms, such as pig, bar, billet, bloom, rod, plate, sheet, hoop, etc., each of which requires different stowage.

Pig iron should be stowed solid, if in small quantities, but large quantities are usually stowed loose in a hold, and the weight kept as high as possible. If in a vessel with a tween deck, a proportion of the cargo sufficient to prevent the vessel's being too "stiff" should be stowed in the tween deck, and well secured.

Bar iron should be stowed quite flat, and care taken in loading and discharging to prevent the ends getting bent.

Plate and sheet iron must be stowed flat, and, like hoop iron, must be kept perfectly dry. Steel hoops are usually in bundles, and are liable to damage by bending if overstowed with heavy cargo.

Steel billets should be kept clean and well clear of oil, as cases have occurred

where they have been ruined for making tinplates by contact with oil.

Steel tubes may be of any length, either loose or in bundles. They are often coated with tar, the more valuable tubes being bound round with a tarred material and chalk-covered to protect them. All tubes should be stowed fore and aft and well blocked off.

Great care must be taken to keep steel dry, as the slightest rust will often ruin steel articles, especially such as coils of thin iron bands.

Different lots of iron and steel should be separated—a strand of rope will serve the purpose—but care must be taken to see that it is dry.

Before overstowing iron or steel with any other cargo, good dry flat dunnage should be used.

QUESTION

What precautions would you take in the stowage of jaggery?

ANSWER

Jaggery is an exceedingly moist sugar obtained from a certain variety of palm tree grown in India. It quickly melts in hot weather, and tends to become one viscous mass, from which a thick syrup drains. The loss of weight sometimes amounts to 10 per cent or more after a voyage through the tropics.

If overstowing with other cargo, the jaggery should be well boarded over and heavily matted so as to preclude all possibility of top cargo getting into contact or mixing with jaggery.

Goods susceptible to damage from moisture should not be stowed in the same vicinity; neither should bag seed be stowed over same, if that can be avoided, owing to the danger of seed's mixing with the jaggery. The bill of lading should adequately protect vessel for any loss of weight.

QUESTION

What must be particularly guarded against when loading jute?

ANSWER

Jute is a fiber obtained from an Indian plant. It is really a coarser flax or hemp, manufactured largely for packing canvas and many other articles, such as carpet backings, and fabrics for the base of linoleums, etc.

Jute is usually packed in pressed bales, each of which consists of many bundles. In the season, it is much shipped from Calcutta, and many full cargoes are carried. At one time it was generally screwed into a ship in an almost identical manner to cotton, but the loss of time and the additional expense incurred in so doing do not warrant this being done at the present day.

Before loading jute, care must be taken to see that the holds are thoroughly cleaned and perfectly dry. All floors, decks, etc., must be well matted, and the bales must not be allowed to touch iron on any account, or rust will badly damage the contents.

It was at one time thought that jute was liable to spontaneous combustion, but this has never yet been proved, and is still open to doubt. It is, however, especially necessary to use all precautions to guard against fire, for if a flame comes in contact with a bale of jute, it will spread over the outside edge like a flash; and it has been known, where a lamp accidentally touched a bale of jute, for the flame to run right underneath a deck, where it was impossible to extinguish it with water.

A cargo of jute, especially new jute, is particularly liable to sweat; therefore every precaution must be taken with regard to the ventilation of holds.

It is particularly advisable to leave air spaces in the hatch coamings, and also underneath the deck ventilators, in order to afford a passage for the vapor to rise.

QUESTION

What is lampblack, how is it shipped, and where is it usually stowed?

ANSWER

Lampblack is an almost pure form of carbon, and is a soot produced by burning in furnaces the coarser parts of tar, etc. It is much used in the manufacture of inks. It is usually shipped in packed cardboard cartons or paper packets, which are in paper-lined cases. These cases are often very lightly constructed, and must be handled carefully and not worked over, as they are easily broken and may suffer loss of contents besides damaging other cargo stowed in the same hold. If newly made, lampblack is said to be liable to spontaneous combustion, and in some ports is classed as hazardous goods.

Stow near hatchway, and protect other cargo from damage by siftings of the lampblack.

QUESTION

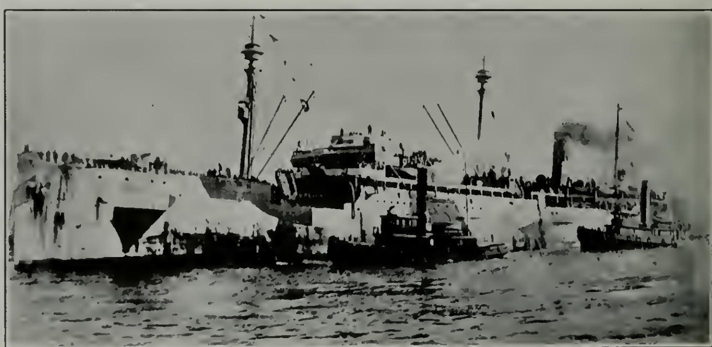
How should linseed, linseed cake, and linseed oil be carried?

ANSWER

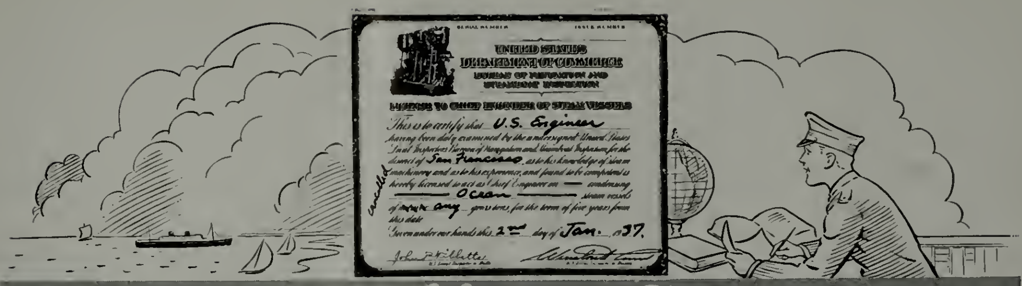
Linseed, or flax seed, is the seed of the flax plant, from which linseed oil is obtained. It yields from 37 to 40 per cent of oil, is very liable to heat and should be well ventilated. It is largely carried in bags, and when so carried must be well dunnaged, matted and ventilated. It is one of the worst kind of seeds for shifting, its angle of repose being less than that of any other class of seed shipped in bulk. When shipped in bulk, it must be stowed like grain, with shifting boards which should be close fitting.

Linseed cake is made from refuse of linseed after the oil has been extracted, and is used for feeding cattle. It is packed in bags or made up into packages covered with gunny, and, on occasions, shipped in the loose condition. Stow clear of strong-smelling goods, such as turpentine, onions, fruit, etc., and, as this commodity is given to heating, stow in a well-ventilated space, clear of articles liable to be affected by the heat so generated.

Linseed oil is obtained from flax or hemp seed, and is shipped in barrels and occasionally in bulk. The temperature at which it solidifies being from 5 degrees to 17 degrees Fahrenheit, it is not necessary for heating coils to be provided when this oil is carried in bulk.



This picture of the camouflaged Maui reminds us that here is a type of protection about which we hear nothing today



Your Problems Answered

by "The Chief"

"The Chief's" department welcomes questions—Just write "The Chief," Pacific Marine Review, 500 Sansome Street, San Francisco, California

MOTOR-GENERATOR SETS
ON BOARD SHIP

FROM SHIPS

Sir:

. . . Your answer to W. E. H., Richmond, is not complete. We have installed motor generator sets on ships for lighting.

L. E. M., Los Angeles.

Sir:

. . . I note also in October issue your statement that motor generator sets aboard ship are unusual. . . . We have one on our ship. S. L. H., San Francisco.

Sir:

I am in receipt of the October, 1940, issue of Pacific Marine Review, *and wish to call your attention to an error in your answer to a question submitted by W. E. H., Richmond, California.*

His question reads in part, "If you had a 240-volt motor generator, the generator delivering 120 volts, compound wound, 20 kw and 166 amps."

Your answer reads in part, "We do not understand the use of a motor generator on board ship, unless it is a balancer set, to derive 120 volts to neutral from 240-volt ship's power, in which case it would hardly be as large as 20 kw."

W. E. H. is right in stating about such a motor generator aboard ship. Ten years ago I was on a vessel having such a motor generator, and I have seen them on most of these high-pressure ships ever since, including the one I am on now.

R. A. A., N. Y. C.

QUESTION

Sir:

Why are sometimes 3-wire generators, sometimes balancer sets, and sometimes motor generator sets, used for lighting? What are the differences?

W. G. R., San Francisco.

Engineers' Licenses for October

Name and Grade	Class	Condition
PORTLAND		
J. V. Waters, Jr., Chief	SS, any GT	RG
R. Francezon, 2nd Asst.	SS, any GT	RG
C. E. O'Brien, 1st Asst.	SS, any GT	RG
SAN PEDRO		
E. N. Clemons, 1st Asst.	SS, any GT	RG
D. R. Carpenter, 2nd Asst.	SS, any GT	RG
O. T. Fudge, 2nd Asst.	SS, any GT	RG
J. Q. May, 2nd Asst.	SS, any GT	RG
J. T. Thorn, 3d Asst.	SS, any GT	O
F. G. Ernst, Chief	MS, 750 GT	RG
W. H. Douglas, 1st Asst.	MS, 1000 GT	RG
SEATTLE		
L. W. Wharton, 3d Asst.	SS, any GT	O
A. Anderson, Chief	MS, any GT	O
SAN FRANCISCO		
J. H. Dwyer, Chief	SS, any GT	O
D. W. Coker, Chief	SS, any GT	O
C. L. Price, Chief	SS, any GT	O
G. Banasco, Chief	SS, any GT	RG
C. R. Bower, Chief	SS, any GT	RG
J. A. Wayne, Chief	SS, any GT	RG
E. J. Swan, Chief	SS, any GT	RG
A. L. Conroy, Chief	SS, any GT	RG
R. D. Compton, 1st Asst.	SS, any GT	O
V. P. Wineman, 1st Asst.	SS, any GT	RG
O. K. H. Boltz, 1st Asst.	SS, any GT	RG
W. H. Greenlee, 1st Asst.	SS, any GT	RG
J. W. Wadick, 1st Asst.	SS, any GT	RG
J. L. Duesler, 2nd Asst.	SS, any GT	O
J. Drummond, 2nd Asst.	SS, any GT	O
W. F. Doyle, 2nd Asst.	SS, any GT	RG
D. W. Coker, 2nd Asst.	SS, any GT	RG
S. A. Walters, 2nd Asst.	SS, any GT	RG
D. Barrett, 2nd Asst.	SS & MS, any GT	RG
L. A. Barker, 3d Asst.	SS, any GT	O
J. F. Lindeberg, 3d Asst.	SS, any GT	O
L. A. Fleming, 3d Asst.	SS, any GT	O
J. H. Foye, 3d Asst.	SS, any GT	O

Abbreviations: SS is steamer; MS is motorship; GT is gross tonnage; O is original license, RG is raise of grade. All of these licenses are for ocean service.

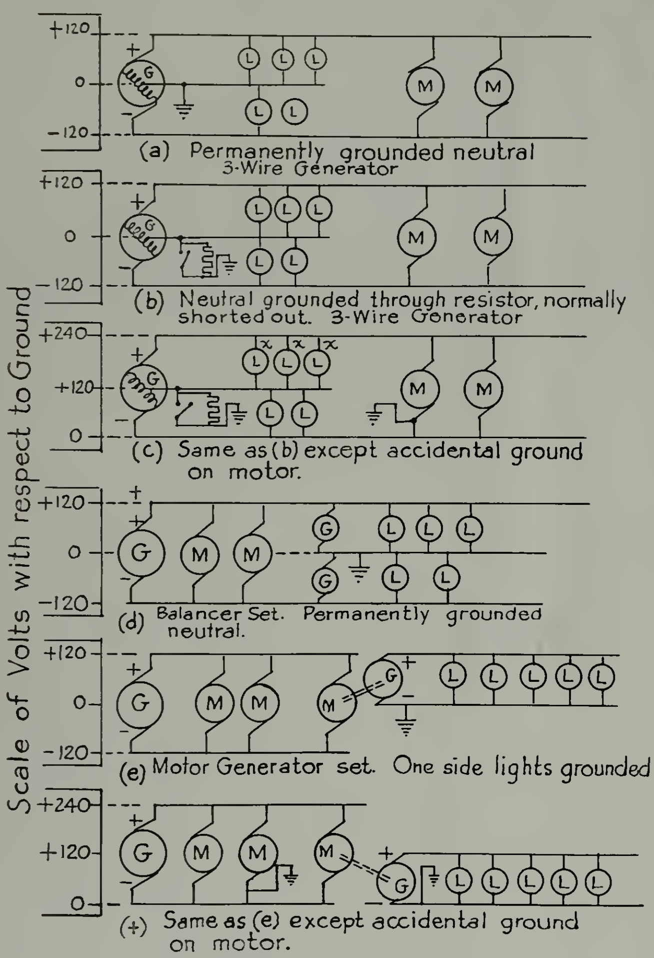
SPECIAL NOTE

As often stated in these articles, when a question seems to be important or urgent enough, we will interrupt our regular series to give specialized attention to it. This question seems to be one of importance and wide interest. It is gratifying to note the immediate response when an incomplete or wrong statement is published in this series. In lieu of apologies, we will give as complete and accurate analyses of the questions as is possible.

ANSWER

R. A. A. and others are right. There are more motor generators used for lighting aboard ship than "The Chief" had expected. The complete analysis is as follows:

The principal cause for the use of these systems is: (a) lighting circuits are standardized at 120, 115, 110 volts, both ashore and afloat; (b) standards and codes of authority and good engineering require that one side of all lighting circuits be connected to ground or frame of ship, if derived by direct electric circuit from a source of over 150 volts; (c) that there shall be no voltage of over 150 volts to ground on lighting circuits and plug-in outlets. This protects people handling lights and appliances from getting a shock or more than this voltage. In the days of the brass shell lamp socket and braided drop cords, serious shocks were common, and 240 volts may be more than serious. These are American standards. European practice has been and still is 250 volts on lights, frequently with one side grounded, and ground return.



Diagrammatic representation of various circuits used aboard ship

Another fact which brings this into relief is that for power aboard ship, as now used, 120 volts is too low or requires too much copper. It would be impractical for the deck machinery at this voltage.

It should be noted here that in transmitting power over copper wires, if we double the voltage we may transmit four times the power at the same per cent voltage drop and watts loss. This comes about from Ohm's Law, E=RI, and watts=EI. Let the reader work this out for himself, or, if further interested, write in about it. Thus at 240 volts we need only one-fourth the copper for power.

We are also limited to 120 volts on lights because at 120 volts the lamp is much more rugged and is a decidedly better lamp for both light output and life.

The 3-wire system, originated by Thomas A. Edison, and frequently called the "Edison System," allows us to transmit the lighting load at 240 volts and at the same time use only 120-volt lamps. It uses two lamps in series, the same current passing through each, with a fall in voltage of one-half the line-to-line value in each. If the lamps are of a different size, or we are unable to balance the two groups exactly, so that one group requires more current than the other, the difference must flow back to the generator over a neutral or common wire. This common wire, or third wire, carries only the difference, which may be very small. It can never be greater than the current in one of the line wires. It might easily be of smaller size than the two line wires, but it is customary to make it the same size on lighting circuits, of only a few kw load, and to make it smaller on larger loads, since the larger the load and more lamps connected, the more likely it is to be evenly divided between the two sides of neutral, and the smaller the per cent of line current in the neutral.

When the 3-wire system is used, invariably the neutral is grounded. This prevents the 240 volts from being applied to any of the circuits with respect to ground.

There is no need of the 3-wire system on the ship's power circuits. The current from the grounded neutral or common wire must be led back to the generator. This is accomplished in two ways: (a) The 3-wire generator, where it goes into the center tap of a transformer whose two outside wires are connected to the armature through slip rings. This transformer may be mounted or built into the rotor of the generator, and the neutral brought in on one slip ring. (d) By the use of two generators coupled mechanically together, each 120-volt rating connected in series. These two systems are shown schematically in (a) and (d) in accompanying figure. The theory of just how the neutral current gets back to the generator is rather obscure, but will be discussed if any interest is shown.

There are many good reasons why it might be desirable to separate the lighting and power circuits electrically. With one side of the lighting grounded, using the 3-wire system, if an accidental ground comes on anywhere, the circuit involved is tripped off by its breakers. This is true of the 240-volt power circuits as well as lights. For instance, suppose a ground comes in the motor of the anchor hoist just at the time it is needed. It is shorted and tripped out, as grounding one line causes current to flow through the frame of the ship back to the lighting neutral grounded, and we have 120 volts, causing current flow until it is tripped out. The equipment cannot be used until the ground is cleared, which may take minutes or hours.

Another reason, not so important, is that a bad collector ring on the 3-wire generator, causing rapidly-varying resistance to the neutral current, will cause the

voltage of the live wires to vary a fraction of a volt or more with respect to ground, which seriously disturbs the radio reception of the ship.

The advantages of the 3-wire system are so great, however, as to warrant an effort to use it, and at the same time not to disable an important machine because of a ground. This is accomplished on some of the new Maritime Commission ships, as shown schematically in (b) and (c) of the diagram. The neutral is grounded through the contacts of an automatic circuit breaker, so that when the current to ground exceeds a calibrated amount, say 25 amps, or maybe 50 amps, the breaker opens. Across its contacts is connected a resistor, whose ohmic value and capacity is such as to limit this ground current to a small value. Figure (b) shows the normal position, and (e) with breaker tripped. The voltage scale at the left shows the value of the voltages with respect to ground. Note that normally [Fig. (b)] the lighting circuits have no more than 120 volts to ground, but when a ground occurs on a power circuit [Fig. (c)] and the breaker opens, part of the lights now have 240 volts to ground on them. See lights marked "x."

This scheme could be used as well on a system using a balancer set.

Isolation by electrical insulation is, of course, the complete answer to this problem [see Fig. (e)]. Here there is no electrical connection between the power and lighting circuits. Normally ungrounded, the power circuits may operate successfully with one accidental ground [see Fig. (f)]. By providing for periodic monitoring or inspection of all power circuits as to insulation to ground, and clearing a ground when it is discovered, the accidental ground which appears at the inopportune time is harmless and may be cleared at leisure. It must be cleared, however, as another ground on the opposite side of the line would then trip the breakers.

Although the principal advantage of the 3-wire system is saving copper, that is not the reason for its use aboard ship. Lighting loads and distances are not great enough to make this a controlling factor. Thus when we may generate at 120 volts, we do so, and have no 3-wire system. The 3-wire system aboard ship is used to obtain 240 volts for power and 120 volts for lights from the same system. When motor generator sets are used, the motor is 240 volts and generator is 120 volts. With a maximum of only 120 volts on the generator, it is not necessary, and may not be desirable, to ground one side of the circuit permanently, as shown in Figs. (e) and (f), and as shown grounded in diagram to show the effect if it were so grounded either accidentally or permanently.

With the 3-wire system, the capacity of the transformer in the generator or the balancer set is only that of the expected unbalance. It usually is 25 per cent of the generator capacity, or the balancer set may have a capacity of 25 to 50 per cent of the lighting load.

The balancer set has no advantages over the 3-wire generator, and may be heavier and more expensive than the difference between a 2-wire and a 3-wire generator. It ordinarily will be found on the smaller loads. It is less efficient than the 3-wire generator. If we expected 100 amps in each outside line of 240-volt system for lighting, we might expect a maximum of 50 amps in the neutral. The balancer would consist of two generators each 50 amps at 120 volts or 6 kw.

If we used a motor generator set, the generator would have to be good for 100 amps at 240 volts or 24 kw, and the motor equally large, or, say, 40 hp. Thus for an unbalance of 50 per cent, the motor generator set is four times as large as the balancer set. For 100 per cent unbalance, they would be equal in size.

Therefore the motor generator set, while more expensive, heavier and less efficient than the 3-wire system, isolates the lighting system, so that no system grounds are necessary, and may be considered well worth the weight and expense.

The matter of electrolysis and erosion of ship's piping and frames from electric currents is debatable. Whether or not the grounded system contributes to erosion is an open question, at least for the time being. Will engineers please write in on this phase of the subject, as "The Chief" is collecting data to be discussed later.

Our next article will resume the subject of Boilers.

Mosquito fleet torpedo boats PT3 and PT4 at better than 40 knots on trials in the Detroit River

Ventilation on U. S. Mosquito Torpedo Boats

"Ventilation for the Nation" is evidently no empty slogan as far as the Ilg Electric Ventilating Co. of Chicago is concerned, for this company is actively concerned with ventilation as it relates to the National Defense Program.

Each of two new torpedo boats, the PT3 and PT4, built by the Fisher Boat Works of Detroit, are equipped with three Ilg direct-connected blowers to vitalize the air for the crew of eight, and to remove odors and fumes. The motor on each blower is mounted on the wheel to avoid friction and noise, and to save the space and weight required by a coupled motor mounted on a separate pedestal.

Tests on the Detroit River indicate that these new members of the "Mosquito Fleet" attain speeds of 40 knots. Each boat is: fitted with two machine gun mountings; designed to fire two torpedoes at one time; and powered by two 1200-horsepower Packard motors.

Costing $100,000 apiece, the boats will combine with two similar craft being built in Miami, Florida, the four others constructed in New Orleans and Philadelphia, to form an experimental fleet covered by the $15,000,000 appropriation for development of torpedo boats and submarine chasers.

Pacific NORTHWEST MARINE REVIEW

by Special Correspondent

Shipping

Gains in both foreign exports and imports for the State of Washington were shown in the figures recently given out for the first nine months of 1940 by Philip M. Crawford, acting manager, Seattle office, of the Bureau of Foreign and Domestic Commerce. Total this year is $91,832,849 as compared to $77,373,070 for the same period in 1939. Exports were $61,970,851, an increase of 18 per cent. Imports were $23,951,471, an increase of 25 per cent.

Salmon Shipments Heavy

Gleanings . . . Heavy advance bookings of canned salmon shipments out of Puget Sound are reported, with 140,000 to 175,000 cases on five American-Hawaiian steamers for delivery after January 1. . . . Following the close of the Alaska season this year, all units of the fleet of the U. S. Coast and Geodetic Survey will be engaged in charting the waters of Puget Sound, Juan de Fuca Strait and adjacent coasts. . . . Christmas ship from the Pacific Northwest to Hawaii this year will be the Matson Line freighter Makiki, posted to sail from Seattle on November 29, with her decks piled high with Christmas trees, and her refrigerators filled to capacity with turkeys, celery, fruits and other Christmas delicacies.

Alaska Mail

The S. S. Cordova will sail from Seattle on November 29 to become the commissioned mail vessel on the Alaska Peninsular run out of Seward. The Postoffice Department has awarded the Alaska Steamship Co., owners of the Cordova, the mail contract for one year, and the vessel will become the successor of the motorship Fern and the steamships Starr and Dora on this famous and hazardous route. The Cordova is renowned for having saved the lives of the officers and crew of the U. S. Revenue Cutter Tahoma, lost off the Aleutians in September, 1914. Efforts will be made to maintain a fourteen-day turn-around in the mail route. Plans have also been made by the Postoffice Department to award a contract to Otto Kraft of Kodiak calling for mail service once a month from Kodiak to Shearwater Bay, Port Hobron, McChord, Old Harbor, Alitak, Carmel, Karluk, Uyak and Uganic. The Alaska Traders' motorship Fern will have the mail contract from Dutch Harbor to Bristol Bay and Good News Bay during the open season of navigation, probably from May to October, 1941.

Strike Settled

Grays Harbor's month-old tugboat strike was settled on November 8 through a compromise agreement giving workmen shorter hours and more pay. Two unions, the Masters, Mates and Pilots, and the Inland Boatmen, signed the contract, expiring June 30, 1942. The settlement will permit resumption of operation of seven harbor lumber and shingle mills closed by the strike. The unions originally demanded an eight-hour day with no increase in pay. Operators wanted a twelve-hour day, but were willing to pay more. The compromise fixes a ten-hour day, an increase in wages and a premium for overtime.

Shipbuilding

Under "full speed ahead" orders, work is being rushed at the Tacoma plant of the Seattle-Tacoma Shipbuilding Corp. on the completion of the two C-1 type freighters for the U. S. Maritime Commission, the Cape Alava and the Cape Flattery. The speed with which the work is being carried on is reminiscent of the old war days, when Puget Sound shipyards established new world records in ship production. Rivet guns hammer on steel, and huge cranes lower machinery into the holds of the vessels. The two liners will be completed and turned over to the government exactly on schedule, according to company officials. The Cape Alava will go into service the latter part of January, the Cape Flattery about April 1. The hulls of both vessels were built at the Tacoma yards of the company, and will be completely finished there. A third vessel of the same type will have been launched when this is published. Altogether, this yard has orders for eleven vessels, the backlog of orders having been increased on October 23 by the awarding of another Maritime Commission contract for two C-3 vessels at a cost of $2,990,000 each. To be built so as to be suitable for conversion into transports, these ships are 492 feet in length, 17,000 tons displacement, 16½ knots speed.

Destroyer Alterations

The Todd-Seattle Drydocks, Inc., sharing in an award of alterations to twelve destroyers to be made by the Navy Department to private yards, is starting work on the remodeling of the U. S. S. Mugford, a unit of the fleet stationed at Honolulu until recently, but now in Seattle. The alterations to be made are said to have the purpose of increasing stability and simplifying the vessel's deck plan.

Cement Carriers

One of the largest private contracts to be awarded in the Northwest for some time has gone to the Todd-Seattle Drydocks, Inc., for the rebuilding of the freighters Ancon and Cristobal, recently purchased by the Permanente Steamship Co., a subsidiary of the Permanente Cement Co. The Ancon was formerly the Shawmut, and the Cristobal the Tremont, operated from Puget Sound to the Orient in 1903 by the Boston Steamship Co. They are vessels of 9,604 tons register, 489.5 feet long, 53 feet beam and 28.9 depth, and have been at Balboa, C. Z. They will be converted into bulk cement carriers, in connection with the construction of Army fortifications and housing expansion at the Panama Canal.

A New Shipyard

As forecast in last month's issue, construction of another large new shipyard is now assured on Harbor Island at Seattle by the Associated Shipbuilders, composed of the Puget Sound Bridge & Dredging Co. and the Lake Union Drydock and Machine Co. Building of the new plant has now been assured by the awarding of contracts to the new company for the construction of four large seaplane tenders at a combined cost of $18.181,996. The new yard will be built around the graving docks at the plant of the Puget Sound Bridge & Dredging Co., where the immense concrete pontoons for the Lake Washington bridge were erected. As some of these pontoons were 371 feet in length and 59 feet wide, these graving docks were of considerable size.

An additional expenditure of over $500,000 for buildings, cranes and other equipment is contemplated. The Associated Shipbuilders have also purchased the plant of the Commercial Boiler Works at Seattle, and will move their equipment to the new yard.

A Large Order

At the same time of the award to the Associated Shipbuilders, announcement was also made that six more of these seaplane tenders had been awarded to the Lake Washington Shipyards at Houghton, across the lake from Seattle. Contract price of the tenders awarded the Lake Washington Shipyards is $4,510,000 each, or a total of $27,060,000. Contract price with Associated Shipbuilders is $4,545,-499 each.

Bremerton Busy

The growth of National Defense shipbuilding activities at the Puget Sound Navy Yard at Bremerton has caused such an increase in the number of workmen going to and from Seattle that the Puget Sound Navigation Co. found it necessary during the past month to add the diesel-electric ferry Klahanie to the cross-sound run, making a total of four large ferries now in this service, the Kalakala, Chippewa, Kehlokan and Klahanie.

New Destroyer Yard

Work is being rushed with all possible speed on the construction of the new 30-acre shipbuilding yard for the Seattle-Tacoma Shipbuilding Corp. on Harbor Island, Seattle. Practically all the piling and base work has been completed. The first two of six craneways and an outfitting wharf are taking shape. Sometime in March, 1941, this new five-million-dollar plant will be ready to start work on its contract with the Government, which involves the construction of 20 destroyers at a cost of $137,500,000.

Reverts to Type

At the Winslow Marine Shipbuilding plant at Eagle Harbor on Bainbridge Island, work is progressing on the conversion of the 135-foot freighter Penobscott into a mine sweeper, but it will not be the first time she has served in this capacity. She was built originally during the war as a French mine sweeper, but converted after the war into a freighter, and was used for many years on the East Coast. After all these years, she is now reverting to type.

Outfitting Transports

Three of the five Panama-Pacific Line ships recently bought by the Navy Department will be outfitted in Seattle and Portland as transports. Captain Guy Davis, chief of staff to Rear Admiral C. S. Freeman, 13th District Commandant, states that two of the 8,378-ton vessels will be made over by the Willamette Iron Works, Portland, and the other by the Lake Union Drydock & Machine Works, Seattle. Cost of conversion of these vessels is estimated at about $500,000 each.

First C-1 Delivered

First of the three C-1 type vessels to be assigned to the American Mail line for transpacific service out of Seattle, the passenger-cargo steamship Cape San Martin will be delivered to the company in the last of December. Captain J. S. Smith, commander of the Capillo, has been appointed commander. The vessel is now nearing completion at the yards of the Bethlehem Steel Co. on the Bay. The Cape Alava, now nearing completion at the Tacoma yard of the Seattle-Tacoma Shipbuilding Corp., will be delivered to the American Mail line in January, and the Cape Flattery, from the same yard, in March.

Government Acquisitions

Acquired by the War Department from the Maritime Commission, the former American Mail liner President Jefferson, which has been recently lying at Port Orcard near the Puget Sound Navy Yard, has gone to San Francisco to be converted into a troop transport. The former American Mail liner President McKinley, now at Port Orchard, will probably, according to reports, be converted for the same service. The Jefferson is of 14,174 tons gross register. Two other old Mail boats, the President Grant and the President Jackson, are now at Todd-Seattle Drydock, Inc., being converted into Navy transports at a cost of $4,000,000, and will enter the Navy service as the U. S. S. Harris and the U. S. S. Zeilan. The fifth ship, the President Madison, was sold to Philippine interests for $350,000, and renamed the President Quezon. She was lost on the coast of Japan last January.

M. S. Cape Alava at the outfitting dock, Seattle-Tacoma Shipbuilding Corporation, Tacoma Yard, October 28
(Turner-Richards Studio, Tacoma)

Navy Purchases Tug

The $75,000 tug Oswell Foss, newest and most modern unit of the Foss Launch & Tug Co. of Seattle, has been purchased by the Navy as a mine sweeper. She is a new boat, completed during the past year, and is equipped with a 500-hp diesel engine. The Navy Department has purchased a number of other small craft in this district, as well as on the South and East coasts. Among those recently bought in the Pacific Northwest for use as coastal mine sweepers are the fishing vessels J. A. Martinolich, New Bol and New Ambassador. A number of seiners and tuna boats are being negotiated for in Southern California for mine sweepers, and it is rumored that some of the larger yachts on the coast will be purchased for patrol boats.

Dimensions of the Tuna Clipper

by David W. Dickie, N. A.

From an economic point of view, certain sizes of tuna clippers seem to be more efficient than the intermediate sizes, and the design of the refrigeration at each of the efficient sizes is entirely different.

One of the efficient sizes is between 124 and 127 feet length overall, 30.5 to 31 feet beam over the planking at the point of greatest beam, and 15.8 to 16 feet depth from the rabbet at the keel to the top of the deck plank at the middle of the overall length.

The normal width of the central fore and aft alleyway in the hold is 5 feet 4 inches to 5 feet 6 inches, depending on the size of the engine. At the hatch the alleyway widens to about 7 feet 4 inches, so part of it can be used for a pump room to relieve congestion in the engine room.

When the tuna clipper leaves on a voyage, the bait boxes and bait wells are filled, and other wells are filled as the necessities of refrigeration demand. Practically the same condition exists on the voyage home, as an effort is made to substitute for the weight of the fuel, water and stores consumed an equal weight of fish cargo.

The attempt to make an efficient 100-foot tuna clipper cooling and holding the fish in brine proved to be a failure. The boat has insufficient displacement to carry the weight of a proper refrigeration plant, together with a profitable load of fish. In the 100-foot boat it is possible to put a somewhat smaller refrigeration plant, cool the fish down to 30 degrees by means of coils in the wells and circulate the sea water by means of a circulator shown in the October Pacific Marine Review article.

The sea water is then pumped overboard, and some additional heat is removed by circulating air through the fish and coil by using the circulator as a fan.

The method cannot be used to preserve fish in prime condition for a longer time than 20 days, and it is not possible to catch enough fish to fill the boat and get them back to port in time to make it profitable to go to the additional expense of using the system. It is better to build a smaller boat fitted to pack the fish in ice.

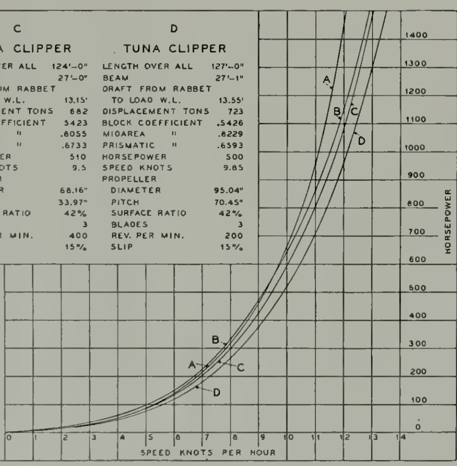
The design was then lengthened to 125 feet, which allowed additional displacement to carry more refrigeration and motive power and a larger pay load that can be kept long enough to allow sufficient time to fill the boat.

To get an idea of how the pay load works out, take a typical tuna boat:

Full load displacement..............		682 tons
Light loaded displacement	463 tons	
Less fuel, water, stores used on the outbound voyage	49 tons	
Net displacement at the fishing grounds		414 tons
Net weight allotted to cargo.........		268 tons
Whether the fish are brought in wet or dry, one-fifth of the cargo will be water while being cooled..........		53.6 tons
Net weight of fish (2240 lbs. ton)....		214.4 tons
Fish are delivered in short (2000 lbs.) tons 214.4×1.12=		240 tons
The bait water the boat needs is at least 40% of the total amount the boat will carry 268×.4=		107.2 tons

The bait water is distributed to the bait boxes on deck and bait wells in the hold, and pumped overboard as the cargo is being stowed.

A		B		C		D	
TUNA CLIPPER		TUNA CLIPPER		TUNA CLIPPER		TUNA CLIPPER	
LENGTH OVER ALL	100'–0"	LENGTH OVER ALL	125'–0"	LENGTH OVER ALL	124'–0"	LENGTH OVER ALL	127'–0"
BEAM	28'–0"	BEAM	30'–9"	BEAM	27'–0"	BEAM	27'–1"
DRAFT FROM RABBET TO LOAD W.L.	14.0'	DRAFT FROM RABBET TO LOAD W.L.	13.75'	DRAFT FROM RABBET TO LOAD W.L.	13.15'	DRAFT FROM RABBET TO LOAD W.L.	13.55'
DISPLACEMENT TONS	827	DISPLACEMENT TONS	792	DISPLACEMENT TONS	682	DISPLACEMENT TONS	723
BLOCK COEFFICIENT	.5587	BLOCK COEFFICIENT	.5244	BLOCK COEFFICIENT	.5423	BLOCK COEFFICIENT	.5426
MIDAREA "	.8144	MIDAREA "	.8018	MIDAREA "	.8055	MIDAREA "	.8229
PRISMATIC "	.6880	PRISMATIC "	.6541	PRISMATIC "	.6733	PRISMATIC "	.6593
HORSEPOWER	341	HORSEPOWER	500	HORSEPOWER	510	HORSEPOWER	500
SPEED KNOTS	8.2	SPEED KNOTS	9.2	SPEED KNOTS	9.5	SPEED KNOTS	9.85
PROPELLER		PROPELLER		PROPELLER		PROPELLER	
DIAMETER	75.0"	DIAMETER	91.2"	DIAMETER	68.16"	DIAMETER	95.04"
PITCH	44.5"	PITCH	54.84"	PITCH	33.97"	PITCH	70.45"
SURFACE RATIO	42%	SURFACE RATIO	42%	SURFACE RATIO	42%	SURFACE RATIO	42%
BLADES	3	BLADES	3	BLADES	3	BLADES	3
REV. PER MIN	280	REV. PER MIN	240	REV. PER MIN.	400	REV. PER MIN.	200
SLIP	20%	SLIP	15%	SLIP	15%	SLIP	15%



SPEED AND HORSEPOWER CURVES AT MAXIMUM LOAD DRAFT

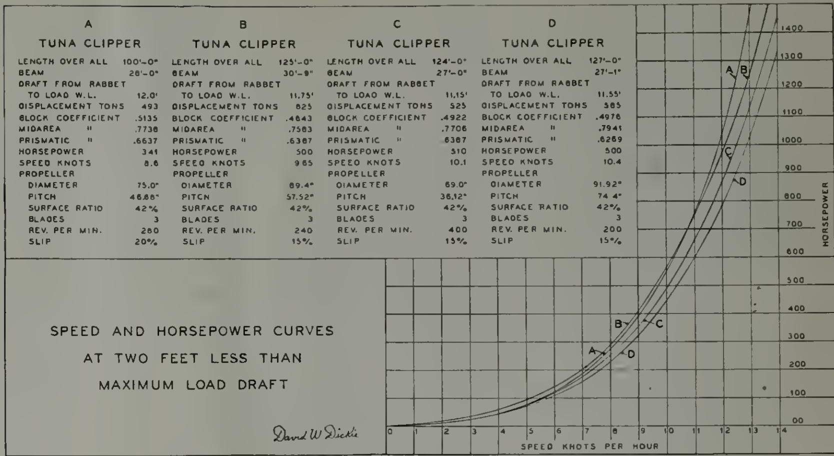
David W. Dickie

The pay load in the ice boat is a little different:

Vessel fully loaded....................		240 tons
Vessel light load............	150 tons	
Less fuel, water, stores used on the voyage outbound	12 tons	
Net light load of the boat at the fishing grounds		138 tons
Net weight allowed for cargo..........		102 tons
About 40% of the 102 tons will be ice stowed before leaving.....	41 tons	
One-third of the ice melts and is pumped overboard......	14 tons	
Ice remaining at the fishing grounds...		27 tons
Net fish cargo (2240 lbs. tons) 102—27 tons		75 tons
Fish is delivered in short (2000 lbs.) tons 75×1.12=		84 tons
The bait water is the same as the ice...		41 tons

If we divide by the amount of fish that can be caught and stowed per day, it will be seen that the ice boat is limited in size on account of the time limit on the length of the voyage. On the 100-foot boat using the sea water cooling and dry carriage,

	A TUNA CLIPPER	B TUNA CLIPPER	C TUNA CLIPPER	D TUNA CLIPPER
LENGTH OVER ALL	100'-0"	125'-0"	124'-0"	127'-0"
BEAM	28'-0"	30'-9"	27'-0"	27'-1"
DRAFT FROM RABBET TO LOAD W.L.	12.0'	11.75'	11.15'	11.55'
DISPLACEMENT TONS	493	825	525	585
BLOCK COEFFICIENT	.5135	.4843	.4922	.4976
MIDAREA "	.7738	.7583	.7706	.7941
PRISMATIC "	.6637	.6387	.6387	.6269
HORSEPOWER	341	500	510	500
SPEED KNOTS	8.6	9.65	10.1	10.4
PROPELLER				
DIAMETER	75.0"	89.4"	69.0"	91.92"
PITCH	46.88"	57.52"	36.12"	74.4"
SURFACE RATIO	42%	42%	42%	42%
BLADES	3	3	3	3
REV. PER MIN.	280	240	400	200
SLIP	20%	15%	15%	15%



SPEED AND HORSEPOWER CURVES AT TWO FEET LESS THAN MAXIMUM LOAD DRAFT

the time for stowage is shortened and the carrying time is lengthened a little by the air cooling. Nevertheless the length of the voyage is limited.

Practically speaking, the vessel operates at sea in the nearly full load condition all the time, making it essential that particular attention be paid to obtaining the best speed for the least power while in that condition. On the fishing grounds, cruising speed is all that is necessary. To meet the need, some of the modern diesel engines are being fitted with superchargers, making it necessary to design a compromise propeller between the best possible with and without the use of the supercharger.

Wide differences of opinion exist concerning motive power. It has been governed largely by the financing of the boat. Sometimes an engine manufacturer will finance his type of engine for a boat, and, oftentimes financing overshadows other considerations.

The drawing shows curves of speed and horsepower for the original 100-foot boat, the 125-foot tuna boat and two variations of the larger boat, illustrating different applications of motive power. It is plainly evident that there is no particular gain in speed by having more than 500 horsepower or 600 horsepower with the supercharger. The extra weight of a larger engine offsets any gain in power.

The boat with the greatest displacement brings home $7000 more fish per voyage than the other two large boats. Necessarily it is slower and takes from 6 to 12 hours longer to return from the fishing grounds using the same power. Even the difference in speed can be partially eliminated by careful design. When cruising on the lookout for a school of fish, the speeds are all the same.

There is some difference in speed due to the revolutions of the propeller being more suitable for the speed of the boat, but length, block coefficient and displacement are the governing factors.

By comparing the curves at the two waterlines given, it will be seen that there is a greater difference in speed due to the change in displacement of any selected boat than there is between the four boats if the same cargo is carried, regardless of whether the maximum or normal loading is considered.

The propellers given are figured for the given condition of loading, and it is the duty of the propeller designer to make the propeller a compromise best suited to cover the limits between which the boat will operate.

Technical Papers

(Continued from Page 31)

Included in the laboratory apparatus is an electronic contact device so sensitive that it will indicate with precision vibrations or movements that are not visible to the eye through a 30-power microscope.

The first of the new model basins at Carderock will be ready to undertake outside work on or shortly after January 1, 1941.

(6) Marine Radio Communication and Equipment

By IRVING F. BYRNES

Irving F. Byrnes is chief engineer, Radiomarine Corporation of America. The paper discusses very briefly: the early developments of radio; the actions of International Telecommunication Conferences in setting frequency band assignments to the marine radio services; the development of radio regulations affecting the American Merchant Marine; and the marine requirements to be met in the design of main and emergency transmitters, lifeboat equipment, high-frequency apparatus, the auto alarm and the radio direction finder.

A typical cargo vessel installation is described and illustrated. The special installations required on passenger liners are outlined. The development of radio telephone for harbor and coastal vessels is discussed.

(7) Sound and Radio Aids to Navigation

By COMM. I. L. GILL, U.S.C.G.; *and* LT. COMM. L. M. HARDING, U.S.C.G.

This paper presents a very careful and thorough treatment of the development and present status of sound and radio aids to navigation in the United States, and visualizes the establishment of rigid control of marine traffic in congested channels through the use of radio communications.

We shall be using a full abstract of this paper in a forthcoming issue.

(8) Some Policies of the U. S. Maritime Commission

By REAR ADMIRAL E. S. LAND, U.S.N. *(Retired)*

A full abstract of this masterly paper will appear in the January issue of *Pacific Marine Review*.

(9) Condenser Scoop Design

By E. F. HEWINS *and* J. R. REILLY

This paper covers the results of a long series of model tests of condenser scoops at the Hydraulic Laboratory of the Newport News Shipbuilding and Dry Dock Company, of whose technical staff both authors are members.

These experimental tests provide a basis for design of condenser scoops of predictable performance. The results of model experiments applied to the condenser scoop system on the S. S. America

(Page 68, please)

On the Ways—

SHIPS IN THE MAKING

LATEST NEWS FROM AMERICAN SHIPYARDS

Recent Launchings

There were numerous launchings of both naval and mercantile vessels from American shipyards during November. Among the more important of the merchant vessels launched were:

S. S. Cape Ann, November 2, at the Staten Island Yard of the Shipbuilding Division of the Bethlehem Steel Company. Sponsored by Mrs. David R. Wilderding; an unallocated C-1 cargo steamer for the U. S. Maritime Commission.

S. S. Fred Morris and S. S. Reuben Tipton, November 2 at the Federal Shipbuilding and Dry Dock Company for Lykes Bros. Steamship Company, two C-1 cargo steamers, sponsored by Mrs. Fred Morris and Mrs. Reuben Tipton, wives of the Lykes Bros. officials for whom the ships were named.

S. S. Cape Mendocino, November 14, at the Long Beach, California, yard of the Consolidated Steel Corporation; a C-1 cargo steamer. Full particulars in a separate article on page 26 of this issue.

M. S. Sweepstakes, November 14, at the Tampa Shipbuilding Co., Tampa, Florida; a C-2 motorship for the American Pioneer Lines. Sponsored by Miss Dorothy Clay Ramspeck, this vessel is a sister of the Shooting Star, described on page 42 of this issue.

S. S. Examiner, November 16, at the Fore River Yard of the Shipbuilding Division of the Bethlehem Steel Co., Quincy, Massachusetts; a C-3 (Export type) cargo steamer for the American Export Lines. Sponsored by Miss M. Nicol, twelve-year-old daughter of Robert Nicol, director for India of the American Export Lines.

S. S. Mormackyork, November 16, at the Kearny, N. J., yard of Federal Shipbuilding and Dry Dock Co.; a C-3 cargo vessel for Moore-McCormack Lines, Inc. Sponsored by Mrs. W. T. Moore, this launching was less than four months after keel laying.

S. S. President Garfield, November 20, at the Newport News Shipbuilding & Dry Dock Co., Newport News, Virginia; a C-3 combination cargo and passenger steamer for the round-the-world services of the American President Lines, San Francisco. Sister ship to President Jackson, described on page 32 of this issue. Sponsored by Miss Eugenia Merrill, daughter of Mr. and Mrs. Keith Merrill of Washington, D. C., and godchild of Rear Admiral Emory S. Land, U. S. N. (ret.), chairman of U. S. Maritime Commission.

M. S. Rio Hudson, November 27, at the Sun Shipbuilding and Dry Dock Co., Chester, Pennsylvania; a C-3 combination passenger and cargo vessel for the Moore-McCormack Lines, Inc. Sponsored by Mrs. Warren Lee Pierson, this is the first of four sister ships. They will be

This picture shows the November launching most interesting to marine engineers. S. S. Examiner, here sliding off the ways at Bethlehem Fore River Plant, is to be fitted with a steam plant carrying 1235 psi gage pressure and 750° F. temperature at the superheater outlet. A triple expansion turbine will be used, and the exhaust of the high-pressure stage will be reheated to 750° F. With this plant, the Maritime Commission engineers expect to get a fuel consumption of 0.5 pounds per shaft horsepower hour for all purposes

fitted for 197 passengers, and are the first vessels ever designed for air conditioning in every stateroom.

M. S. Cape Cleare, November 30, at the yard of the Seattle-Tacoma Shipbuilding Corp., Tacoma, Washington; a C-1 cargo motorship sponsored by Mrs. William E. Boeing.

S. S. President Jackson, by the Newport News Shipbuilding and Dry Dock Company, to American President Lines. *See full description of this ship beginning on page 32 of this issue.*

S. S. Zoella Lykes, November 7, by the Federal Shipbuilding and Dry Dock Co., to Lykes Bros. S. S. Co., Inc.; a C-1-B cargo steamer.

S. S. Deltargentino, November 8, by the Sparrows Point Yard of the Shipbuilding Division of the Bethlehem Steel Co., to the Mississippi Shipping Company.

M. S. Shooting Star, November 12, by Tampa Shipbuilding Co., to U. S. Navy; a C-2 cargo motorship. See description of this vessel beginning on page 42 of this issue.

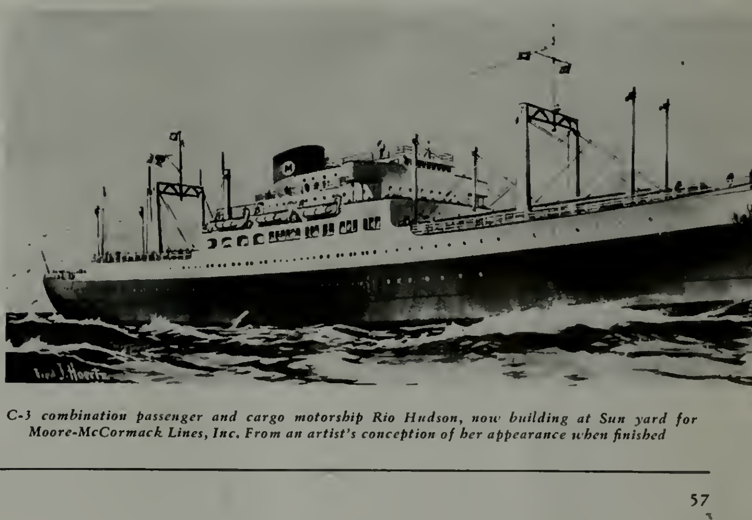
Deliveries

During the latter part of October and the calendar month of November, the following merchant vessels were delivered by American shipyards:

S. S. Joseph Lykes, October 15, by Federal Shipbuilding and Dry Dock Co., to Lykes Bros. S. S. Co. of New Orleans; a C-1-B cargo vessel.

U. S. S. Pokomoke, October 16, by the Ingalls Shipbuilding Company, Pascagoula, Mississippi, to U. S. Navy; a C-3 cargo steamer.

S. S. Executor, October 22, by Fore River Yard of Shipbuilding Division of the Bethlehem Steel Co., to American Export Lines, Inc.; a C-3 (Export type) cargo steamer.



C-3 combination passenger and cargo motorship Rio Hudson, now building at Sun yard for Moore-McCormack Lines, Inc. From an artist's conception of her appearance when finished

S. S. Reuben Tipton, a C-1-B cargo steamer, on November 29, by Federal Shipbuilding and Dry Dock Company, to Lykes Bros. S. S. Co., Inc.

S. S. James Lykes, a C-1-B cargo steamer, on November 29, by Bethlehem's Sparrows Point Yard, to Lykes Bros. S. S. Lines, Inc.

Federal Launches Interesting Twins

On November 23 Federal Shipbuilding and Dry Dock Company launched two U. S. Navy destroyers, named Ericsson and Edison in honor of two of the greatest creative inventors that this country has known, and each ship was sponsored by a relative of the inventor for whom the vessel was named.

U. S. S. Destroyer Edison was launched first, and was sponsored by Mrs. Thomas Alva Edison, widow of the famous inventor.

Twenty minutes later, U. S. S. Destroyer Ericsson was launched, and was sponsored by Mrs. Ruth E. Wallgren of Folcroft, Pennsylvania, a great-great-grand-niece of the late John Ericsson. Mrs. Wallgren is said to be herself a designer of machinery for steamships, and worked on the designs of the propulsion machinery for these two destroyers.

Bids Asked for on One New, Two Old Ships

The Maritime Commission announced on November 27 that it had invited bids for purchase of two old vessels and one new vessel now under construction.

The new vessel is of the C-1 shelter deck type, of 7,500 deadweight tons, now building at the Pusey & Jones Corporation shipyard, Wilmington, Delaware. The two old vessels are the West Neris and the West Hematite, of 8,556 and 8,542 deadweight tons, respectively, now laid up at New Orleans, Louisiana.

The new vessel will be sold for the high bid not less than the domestic cost, which is the contract price of the vessel, $1,928,000 as adjusted, plus the cost of additional equipment furnished by the Commission.

The old vessels will be sold for cash on an "as is, where is" basis.

The purchaser of either or both of the old vessels must agree to replace it or them, either by construction or purchase, within two years, with one new vessel of a size, type and speed satisfactory to the Commission. The C-1 being offered at this time may qualify as a replacement.

The bids will be opened in Room 7856, Department of Commerce Building, Washington, D. C., at 12:15 p.m., E.S.T., December 17, 1940.

Marine Transport Bids Called

The Maritime Commission announced on November 29 that it has invited bids for the construction of two marine transports.

Bids must be received before 12 o'clock noon, December 23, 1940. They will be publicly opened and read the same day.

Associated Shipbuilders Get 4 Seaplane Tenders

The U. S. Navy has awarded a contract to the Associated Shipbuilders, Inc., of Seattle, Washington, to build four seaplane tenders at a cost of $4,545,499 each, or a total of $18,181,996.

The Associated Shipbuilders is a combination of the Lake Union Dry Dock and Machine Co. and the Puget Sound Bridge and Dredging Co. The firm is building a large shipyard on the Harbor Island property of Puget Sound Bridge and Dredging Co., where a considerable equipment incidental to shipbuilding operations was already in place. They figure an additional expenditure of over $500,000 for buildings, cranes and machinery. Very recently they purchased the Commercial Boiler Works of Seattle, and are moving that equipment to the new yard.

Six Tenders for Lake Washington Yard

The Lake Washington Shipyards at Houghton, Washington, were awarded a contract by the U. S. Navy to build six seaplane tenders at a contract price of $4,510,000, or a total of $27,060,000. This busy fresh-water shipyard already has under order or construction:

Four anti-submarine net tenders for the United States Navy at $2,000,000.

One thousand anti-submarine net floats for the United States Navy at $400,000.

One large U. S. Coast and Geodetic Survey ship at $1,279,000.

This makes a total in hand of $3,679,000.

The new order, therefore, gives them $30,739,000 in Government contracts.

New Cutler-Hammer Plant in San Francisco

On October 1 Cutler-Hammer, Inc., Milwaukee, Wisconsin, manufacturers of motor control, safety switches and allied electrical equipment, opened their new factory, warehouse and sales office at 711 Potrero Avenue, San Francisco, Calif.

This new plant is a modern, one-story structure, typical of today's factory architecture, with every facility for efficient fabrication and production of panel boards, switchboards, multi-breakers and special assemblies of motor control, C-H items which have been exceptionally popular on the West Coast. Distribution is handled through four sales offices: Los Angeles, San Francisco, Portland and Seattle.

The building also includes large warehouse space with complete facilities for stocking and handling the company's line of electric control apparatus.

Pacific Coast sales headquarters of Cutler-Hammer will also be located in the new building. F. H. Oberschmidt, manager of the San Francisco office, supervises the Seattle, Washington, and Portland, Oregon, sales offices as well.

Electric Transformer Production for Defense

Production to meet transformer requirements under the Government's National Defense Program has been increased at Westinghouse Sharon Works, world's largest plant devoted exclusively to transformer manufacture.

Being built in the plant at present are 500 distribution and instrument transformers for Navy shipbuilding.

Among major orders affecting national defense and being built at Sharon are three huge electric furnace transformers, among the largest ever built. One will supply current to an electric furnace in a steel mill which is turning out alloys for airplane parts. Rated at 12,000 kva, it stands 14 feet high and weighs 45 tons.

The last of seven 50-ton transformers for Bonneville Dam in Washington is nearing completion. Much of the output of this power development is expected to be made available to manufacturers in various lines of defense preparedness. These transformers are 28 feet high and are rated at 25,000 kva each. Another power unit for defense is a 4,500-kva transformer ordered by a furnace manufacturer. This unit will ultimately be installed in a steel mill for production of preparedness materials.

Safe Conditions

On Board Merchant Vessels

A set of minimum standards presented by a Committee of the Marine Section, National Safety Council

(A) Safe Working Places

Subdivided to three Sections, viz.: (1) Deck; (2) Engine; and (3) Steward's.

Under subdivision (1), there is to be considered provision for safety through the medium of:

(a) Decks clear and free of refuse, loose dunnage, scattered gear, oil and grease, etc.
(b) Properly-lighted decks and holds for working at night.
(c) Proper lighting for work aloft at night. (Rigging and dismantling booms and radio aerials.)
(d) Proper walkways, with guard ropes, and lighted at night, over all deck cargo which obstructs passageways fore and aft.
(e) Ample space, free from obstructions, for working lifeboats and davits.
(f) Proper lighting in lazarette and shaft alley escape.
(g) Winches on platforms above decks and electrically operated.
(h) Weather decks free of all possible obstructions. Any obstructions to be painted white for visibility at night.
(i) Lay-out and construction to agree as nearly as possible with requirements of Government Inspection Bureaus.

Under Subdivision (2), as above:

(a) Proper and sufficient lighting in engine rooms, fire rooms, shaft alleys, steering engine rooms, machine shops, refrigeration engine rooms, dynamo rooms, etc.
(b) Ample working space and passageway in all of the above to permit access to and passageway by various machines, engines, boilers, etc.
(c) Corrugated steel deck-plates, properly secured and free from excess oil and grease.
(d) Catwalks in good repair; also steps and handrails of all ladders (free from oil and grease).
(e) Proper ventilation in fire rooms, engine rooms, etc.
(f) Same as "i" above. (Re construction.)

Under Subdivision (3), as above:

(a) Proper and sufficient lighting in galleys, pantries, storerooms, chill rooms, ice boxes and on all ladders or stairs to and from same.
(b) Proper and sufficient ventilation in above.
(c) Ample space in above to provide easy access to all gear, equipment and stores.
(d) Roughened surface to deck of galleys and pantries to minimize slipping hazard.
(e) Same as "i" and "f" above. (Re construction.)

(B) Safe Gear and Equipment

Subdivided to three sections, viz.: (1) Deck; (2) Engine; and (3) Steward's.

Under Subdivision (1), there is to be considered provision for safety through the medium of:

(a) Guarded winches.
(b) Proper, sufficient and well-marked hatch boards.
(c) Stanchions for lines around all open hatches.
(d) Locking devices for hatch-beams.
(e) Screens for cowl ventilators.
(f) Proper stages with horns bolted and countersunk.
(g) No broken or defective tools.
(h) Goggles for scaling and chipping. Sufficient number.
(i) Guards between lifeboat davits.
(j) Standard working gear and equipment. Frequently inspected. (Blocks, tackle, lines, etc.)
(k) Gangways, properly lighted, and equipped with metal corrugated treads on all steps and double manrope stanchions.
(l) Gas masks and gas detectors.
(m) Proper guards over all deck steamlines.
(n) Hand-grabs from ladders on masts to crosstrees.
(o) Signs *"Caution—Use Other Side"* hung at passageways fore and aft when loading or discharging cargo from port or starboard side only.
(p) Metal plate (demountable) between upper gangway platform and ship's side.
(q) Sign *"Caution—Use Handrails"* on all overheads to ladders and stairways.
(r) Lanyards attached to all beam-bridles.

Under Subdivision (2), as above:

(a) Goggles for chipping, scaling and machine shop work.
(b) Gas masks.
(c) Permanent or demountable brackets for stages in engine and fire rooms.
(d) First aid kits in engine rooms.
(e) Guards over, and railings around, all moving parts of machines (dynamos, refrigerators, etc.).
(f) Guards over all gage and water glasses. (Shatter-proof glass for all gages, etc.)
(g) Portable guard for changing water glasses.
(h) Asbestos gauntlets for use in blowing tubes.
(i) Standard working gear, frequently inspected.
(j) All tools in good condition. No faulty or mushroom heads.
(k) Guards over all emery wheels. (Shatter-proof glass.)
(l) Bar around switchboard panel and rubber mat at base.
(m) Fire extinguishers in all fire and engine rooms.

Under Subdivision (3), as above:

(a) Guard bars for all galley ranges.
(b) Guard bars for all moving machinery parts.
(c) Alarm bells and lights to galleys from ice boxes.
(d) No faulty or broken kitchen utensils.
(e) Handrails on all ladders or stairs to ice boxes.

(f) Hooks for holding open doors of storerooms and ice boxes.
(g) Meat hooks and bars in good condition.
(h) Rubber mats in all baths and showers.
(i) Proper fastenings for chairs, tables, lounges, desks, beds, etc., in all passenger quarters.
(j) Roughened surfaces of all galley and pantry decks.

(C) Safe Methods and Practices—Used in the Different Types of Operations.

Subdivided into three Sections, viz.: (1) Deck; (2) Engine; and (3) Steward's.

Under Subdivision (1), there is to be considered:

(a) Goggles issued to each man when chipping, scaling or painting.
(b) All stagings, lines, etc., inspected before use.
(c) Lashings for all portable ladders.
(d) Safety posters changed weekly and prominently displayed.
(e) Safety cards in all crew's quarters and in all staterooms.
(f) All open hatches guarded by lines around same.
(g) Orders to all not to enter any darkened spaces without flashlight in good working condition.
(h) Orders to report immediately to superior officer any and all injuries or illnesses.
(i) "Medical Log" kept in crew's hospital (on freighters) by officer in charge of same. Notations therein of all treatments and medications given for entire voyage.
(j) No tools to be carried aloft unless properly lashed or in a bucket.
(k) Regular and periodic inspection of all working gear and equipment.
(l) Sneakers or soft-soled shoes not to be worn while at work.
(m) Safety belts for work aloft and over the side.

Under Subdivision (2), as above:

(a) Sign on emery wheel *"Use Goggles,"* and goggles in place on hook over same.
(b) All excess oil and grease to be removed from handrails, steps, gratings and deckplates in and to engine room, fire rooms, shaft alleys, machine shops, ice machines and steering engine rooms.
(c) Use of portable guard when changing water glasses.
(d) All fire bricks removed from wings and stored behind boilers or in the lazarette.
(e) Goggles issued to all when chipping, scaling or painting.
(f) Orders to "Stand aside" when touching off boilers.
(g) Orders that handrails to decks below are not to be slid upon when descending.
(h) Guards around all open deck spaces caused by removal of deck-plates.
(i) Heavy skid supplied for loading engineer's stores through fuel port.

Under Subdivision (3), as above:

(a) Use of oil, grease, gasoline or kerosene forbidden in lighting fires in galleys.
(b) All faulty gear to be discarded to avoid injuries.
(c) Galley, pantry and storeroom decks to be kept free of refuse and grease.
(d) Orders to avoid carrying stores or supplies of weight in excess for one man.
(e) Kitchen gear and utensils to be kept in racks and out of the way.
(f) Safety cards in all passenger staterooms.
(g) Inspection of shower heads and water faucets in all passenger baths and showers.
(h) Caution to passengers to avoid wearing high-heeled shoes when walking or playing games on decks.
(i) Chairs and tables secured to decks in all dining rooms and mess rooms.

Here is a well-earned merit badge and recognition of achievement in safety engineering, of which Byron O. Pickard and his associates are justly proud

PACIFIC MARINE

Reviews

Mrs. Warren Lee Pierson, wife of the president of the Import-Export Bank, sponsored the new Moore-McCormack liner Rio Hudson, launched Wednesday morning, November 27, in the yard of the Sun Shipbuilding & Drydock Company, at Chester, Pa. The Rio Hudson is the first of four passenger and cargo liners which will be launched by Moore-McCormack Lines during the next three months

Leighton Stone of George Swett & Company of San Francisco, on October 21st became the father of a hale and husky son. The new arrival in the Stone household has been christened William Leighton Stone and we can say the proud father, known throughout ship operating and construction circles in the San Francisco Bay area, has been busily engaged passing out cigars.

R. G. Roshong, Southern California Manager of the Crane Packing Company, has been appointed to the post of Chairman of the Membership Committee of the Los Angeles Section of The American Society of Mechanical Engineers. The section chairman is P. L. Armstrong, and E. Kent Springer is vice-chairman. E. M. Wagner is secretary-treasurer. The executive committee is composed of J. Calvin Brown, J. S. Gallagher, J. D. Hackstaff, D. A. Lyons, J. Roy Hoffman, C. H. Shattuck, J. A. Whitaker and R. B. Esselman.

The San Diego committee comprises John L. Bacon, Laurence M. Klauber, Ed R. Prout, O. Franklin Zahn, with Martin J. Poggi as secretary.

E. J. Bradley has been transferred to the San Francisco offices of Matson Navigation Company to become Assistant Freight Traffic Manager, according to an announcement of *M. F. Cropley,* Freight Traffic Manager.

Joining Matson in 1923, Mr. Bradley was first assigned to the Matson freight docks, then in the general freight offices until his transfer in 1929 to New York City as General Agent of Matson Navigation Company.

In 1931, Mr. Bradley was transferred to Honolulu, where he became General Freight Agent for Castle and Cooke, Ltd., Matson general agents in the Territory of Hawaii.

In his 9 years in Honolulu, Mr. Bradley became widely known by manufacturers and shippers as one of the youngest and most aggressive freight agents in the Islands. His advancement to the position of Assistant Traffic Manager in Matson's San Francisco freight headquarters brings to Northern California an executive of wide experience in freight and traffic management.

Captain C. S. McDowell, president and general manager of Enterprise Foundry Company and its Engine and Oil Burner Divisions, announces the appointment of **C. M. Sayre** as production manager and **Hal W. Forsey** as controller. In releasing this news, Captain McDowell said, "We feel particularly fortunate in being able to add Mr. Sayre and Mr. Forsey to our executive staff. Our rapidly expanding production facilities and personnel emphasize the need for the best possible executive leadership in our organization. The excellent business background of both these men will be most helpful in meeting the ever increasing needs of Western industry and production."

Mr. Sayre was formerly connected with Westinghouse Electric and Manufacturing Co., where he was engaged in production work for over eighteen years. Previous to that time he was with the Splitdorf Electric Co. Mr. Forsey comes from Rosenberg Bros. & Co., Oakland, where he was office manager and controller. He has held similar important positions with the Mark Lally Company and the State of California. He has also been associated with such firms as San Joaquin Light and Power Company, Southern California Edison Company, Johns-Manville Company and the Bankamerica Company.

Commenting on business developments, President McDowell stated that prospects for the future look very bright, as all the company's lines are benefiting from the increased business tempo.

K. M. Walker, Marine Surveyor, at Box 248, Point Loma Station, San Diego, California, has announced his appointment as non-exclusive surveyor to the American Bureau of Shipping for the port of San Diego.

New Assistant Manager, G. E. Marine Department

John W. Belanger, in charge of General Electric's marine sales in the Philadelphia district since 1930, was appointed assistant manager of the company's Federal and Marine department on November 14 by D. W. Niven, manager. The appointment took effect immediately. Mr. Belanger is located at Schenectady.

A native of Bath, Maine, he has been with General Electric since August, 1917, when he entered the test course at the Lynn works after receiving his electrical engineering training at Franklin Institute at Boston. In 1919 he was transferred to Schenectady as a student engineer in the Power and Mining Department, specializing in electric arc welding until 1923, when he was transferred to the Philadelphia sales office as arc welding specialist there.

The Mariners Club News of the Month

The Nomination Committee of the Mariners Club, headed by Mr. Winslow D. Conn, chairman, made the following report for nominations of new officers for the coming year:

For President, year 1941, Captain A. T. Hunter.

For Vice-President, year 1941, Erik Krag.

For Governors, 3-year term, E. J. Macfarlan, Thomas Short, Thomas Monroe, C. M. LeCount.

The Nomination Committee also made the recommendation that Walter J. Walsh, outgoing president of the club, be kept on the Board of Governors as legal counsel.

The Christmas Jinks luncheon of the Mariners Club will be held at noon on December 20, at the 365 Club, located at 365 Market Street. Tickets cost $2.50. The sea will be very smooth to start out, but you had better leave word at your office that you will not be back before three o'clock. Special entertainment will be provided, and the members will get the biggest value for their $2.50 that they have ever got.

More About Jinks!

Mr. Bern De Rochie,
Pacific Marine Review,
500 Sansome
San Francisco, Calif.

Dear Bern:

In view of the fact that there are so many banquets during the holidays, our Board of Governors have decided to dispense with our annual Christmas banquet, and in lieu thereof, we will hold a Christmas Jinks in the form of a luncheon:

Date: Friday, Dec. 20, 1940.

Time: 8 bells . . . 12 o'clock Noon.

Place: 365 Club, 365 Market Street, San Francisco.

Repast: Roast Turkey or Fish.

Refreshments: Scotch or Bourbon highballs.

Entertainment: The 365 show as well as our own.

Cost per plate: $2.50.

We would appreciate your cooperation in making this event a success.

With kindest regards, we are

Sincerely,

STANLEY ALLEN,
Secty.

P. S.—You might win a Door Prize!

On Tuesday, November 26th, the Mariners Club of California enjoyed good response to the announcement which had been dispatched to the membership for observing OLD TIMERS' DAY.

The highlight of the luncheon program was the interesting talk of Abe Marks, a real old-timer himself, regaling his audience with "Memories of the Old Days on the San Francisco Waterfront." Abe Marks, it will be recalled, was with the Marine Exchange in San Francisco since the age of 14 years. His address took the form of interesting anecdotes of old-time shipmasters and picturesque waterfront characters of the good old days.

Presiding at this luncheon meeting was Walter J. Walsh.

George Codrington Host!

Convening from all maritime districts of the Nation, prominent figures in the American Merchant Marine field attended the annual banquet of the Society of Naval Architects and Marine Engineers held in the Waldorf Astoria on November 14.

Making a flying trip from Cleveland, Ohio, our worthy publisher **James S. Hines** covered the event for PACIFIC MARINE REVIEW. Publisher Jim writes us very enthusiastically about the grand party which was hosted by **George Codrington,** president of General Motors Diesel Engine Division.

These annual parties of the popular engine-builder are always the magnet for fine get-togethers of maritime personalities. A special room on the first floor of the Waldorf is traditionally the "moorings" . . . and all of the trimmings of a convivial party are always in evidence. A representative list of shipbuilders, ship operators, naval architects and engineers responded to the Codrington invitation . . . and George greeted everybody on arrival with that good old Florida hospitality, making one and all feel very much at home.

"It was a very cheerio gathering," reports Publisher Hines. "We all look forward with keen pleasure to this 'preview' of the Naval Architects Banquet each year."

Appointment

Commander K. H. Donavin announces the appointment of Captain John M. Hultman as Master of the Pacific Republics liner City of Flint. Captain Hultman has been the chief officer for the past two years of the Moore-McCormack liner Brazil. He arrived in San Francisco with his family recently, and took over his command when the City of Flint arrived from the Northwest November 30th.

Captain Hultman is not unknown on the Pacific Coast, as he served on the ships of the Panama Pacific Line operating in the intercoastal trade for several years, and when the three passenger vessels of that line were taken over in September, 1938, in the creation of the American Republics Line Good Neighbor Fleet, he was made chief officer of the liner Argentina. He made two voyages to South America on that ship and then transferred to the Brazil as chief officer and has continued in that capacity ever since.

Captain Hultman served on the Panama Pacific liner California in 1928. That ship has since been named the Uruguay, of the Good Neighbor Fleet, so that he has actually served in all three ships of the Good Neighbor Fleet.

The Blue Ribbon Edition of
PACIFIC MARINE REVIEW

Dedicated to the United States Maritime Commission, the January, 1941, Edition of PACIFIC MARINE REVIEW will survey the great progress already made—and the future program of the Commission—for rebuilding America's merchant marine. Special emphasis will be focused on Pacific Coast Shipbuilding—the field in which PACIFIC MARINE REVIEW is supreme!

Every effort will be made to produce a volume which will long be preserved for its value and interest to America's ship operators, shipbuilders, and the executive personnel of all allied industries.

The publishers of PACIFIC MARINE REVIEW proudly herald this January, 1941, edition as the logical and resultful medium for the Blue Ribbon registration of the merits of your products and service. Your request for rates . . . preferred positions, color, "furnished" inserts . . . closing dates and mechanical data will bring you immediate evidence of our eagerness to make your first of the year investment in Pacific Marine Review's market a definitely profitable one for you!

500 SANSOME STREET · **PACIFIC MARINE REVIEW** · SAN FRANCISCO

News of the Propeller Clubs of the United States

A banner attendance was on hand at the Comstock Room in the Palace Hotel on Wednesday. December 4th, to sit in on the first December meeting of the Propeller Club Port of San Francisco.

President Charles L. Wheeler brought the membership up to date on recent plans worked out by the Board of Governors, including the report of the Board's decision to campaign earnestly for the 1941 National Convention.

President Wheeler also outlined what is being charted in the way of future programs for the San Francisco group.

The introduction followed of Marshall Levis, vice president of Marsh & McLennan, prominent Pacific Coast marine insurance agency, who gave an exceedingly informative and interesting paper on Some Effects of War on Marine Insurance.

The speaker's discussion was indeed comprehensive. "War affects ship operations and vitally influences insurance on hulls and cargo," he stated. An analysis followed, detailing the manner in which the claims are decided . . . whether as a consequence of hostilities . . . or, in line of peaceful operation.

The full text of Speaker Levis' talk, which will come to us after our December closing date, will appear in the next issue.

At the meeting it was announced that President Wheeler and Edward H. Harms will leave immediately for New Orleans to attend the American Merchant Marine Conference and the National Convention of the Propeller Clubs of the United States.

Extending the invitation of the Port of San Francisco, our delegates have adopted the slogan—"Win With Wheeler."

Port of Tacoma

The November dinner and meeting of the Propeller Club, Port of Tacoma, was held Tuesday evening, the 26th, at the University-Union Club.

Immediately after the dinner, the President called the meeting to order, after which he brought up various matters to be discussed by the Club, among them being the Annual Convention to be held next month at New Orleans. The Club will not be directly represented but Captain Langley of the Seattle Club, as usual, is representing both Tacoma and Portland, as well as his own Club.

The speaker of the evening, Mr. A. B. Comfort, was introduced to the Club members by President Moore. Mr. Comfort's talk was thoroughly enjoyed by everyone present and was in regard to the National Association of Manufacturers and the Better Understanding of Private Enterprise program. He particularly dwelt on the gold situation in the United States, with special reference to the concentration of gold and its effect on the future of American business.

Immediately after Mr. Comfort's address, the general meeting was adjourned.

The members of the Board of Governors remained after the meeting, at the request of the President, for the purpose of appointing nominating committees to take care of the election of officers, to be held at next month's meeting.

The President appointed the following to act as one committee:

Perry Moore
Beecher McKenzie
K. M. Kennell

The Board of Governors appointed a committee as follows:

Phil Gruger
Arnaud Lefevbre
Casey Davison

Port of Los Angeles

Members of the Propeller Club, Port of Los Angeles No. 66, at their luncheon-meeting October 30, held in the main dining room of the Chamber of Commerce, were informed by Captain Richard B. Coffman, U.S.N., of the role Los Angeles Harbor will play in the event war comes to the Pacific.

Captain Coffman, assistant commandant of the Eleventh Naval District, with headquarters in Long Beach, declared that the Los Angeles Harbor district, in addition to serving as the most important American fueling port, will be used as a supply base.

"Should America be unhappily forced into this war," Captain Coffman said, "our commercial shipping's first task would be to bring to our shores the vast flow of strategic materials essential to the National Defense, such as rubber, tin, chromium, hemp and manganese.

"Probabilities are that the bulk of these materials would have to be transported across the Pacific, because other routes might be unavailable for one of several military reasons. This port, therefore, would be of primary importance as a port of discharge for this material, not only because of its location and superior cargo-handling facilities, but also because the adequate transportation facilities leading out of the Los Angeles area would expedite the distribution of the various cargoes to their ultimate destinations. Likewise, the exceptional industrial potential of this area would facilitate the creation of industries locally using these strategic materials for manufacture of military necessities."

The meeting, one of the best attended, was presided over by Propeller Club President Ralph J. Chandler, resident manager of the Matson Navigation Company. President Chandler announced the appointment of James Adams, admiralty attorney, as chairman of the House or Program Committee and Fred A. Hooper, district manager of the American-Hawaiian Steamship Company, as chairman of the Resolutions Committee.

November Program

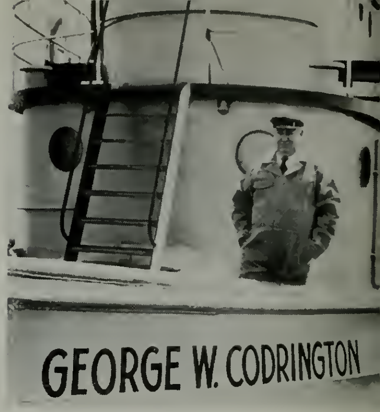
In a celebration marking the centenary of regularly established steamship operation on the Pacific Ocean, steamship leaders from all of the Los Angeles-Long Beach area joined with the Propeller Club in an evening program at Long Beach on Tuesday evening. The meeting was the only Pacific Coast observation of the anniversary.

The meeting, one of the best attended in the recent Propeller Club series, was under the general chairmanship of Ralph J. Chandler, resident manager of the Matson Line. James Adams, chairman of the house committee of the Propeller Club, arranged the program, and Howard Wickersham, member of the committee, introduced the guests present and presented the speaker of the evening.

All-Welded Steel Diesel-Electric Tug

George W. Codrington, president of the Cleveland Diesel Engine Division of General Motors Corporation, is the leading builder and exponent in this country of diesel-electric marine power, which is notable for its dependability, speed and maneuverability. In his younger days Mr. Codrington was a marine chief engineer, and when, on October 21, at Port Arthur, Texas, a diesel-electric tug named in his honor was given her trials, he donned overalls and acted as her chief.

George Codrington, Chief Engineer



Tug on trials

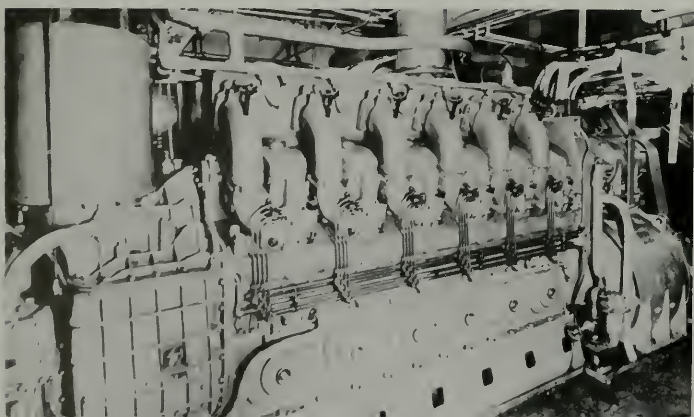
The George W. Codrington is a welded steel boat built to the requirements of the American Bureau of Shipping, designed by Geo. B. Drake of New York, and constructed by the Gulfport Boiler and Welding Works, Inc., of Port Arthur, Texas. All plating and structural members in the hull are of mild open-hearth steel, and all steel joints in the hull are welded by the electric metallic process.

The vessel has an overall length of 102 feet 2 inches, a molded beam of 24 feet, and a molded draft of 12 feet 4 inches. Her fuel capacity is 520 barrels, and her lubricating oil capacity 400 gallons.

Complete propulsion machinery for the George W. Codrington, including main and auxiliary engines, electrical equipment and reduction gear, was designed, built and installed by General Motors. The propulsion power plant is a Model 12-278, 12-cylinder, 2-cycle General Motors diesel engine, rated 1200 bhp, 750 rpm, direct-conected to an 800-kw generator, which furnishes current for a 1000-hp propulsion motor. The main engine also drives a 24-kw exciter generator by V-belt connection.

The drive is through a 1000-hp reduction gear unit, 160/200 shaft rpm, with sub-base common to gear housing and propelling motor. The main engine operates at half speed until the propeller reaches half-speed. Higher propeller speeds are obtained by increasing the engine speed in any desired number of steps up to full engine speed.

Tug's diesel-electric power plant



The auxiliary engine is a Model 3-71, 3-cylinder, 2-cycle General Motors diesel engine, rated 45 hp, 1200 rpm, and direct-connected to a 30-kw generator.

Operation of the main engine can be controlled from the pilot house, the after deck or the engine room.

A steering engine, controlled from the pilot house or from the end of the main deck house, is driven by a 7½-hp, 125-volt D.C. electric motor. The gypsey, mounted to starboard of after towing bitts, is driven by a 12½-hp, 125-volt D.C. electric motor with controls on after end of the main deck house.

Commodious, airy quarters are provided for officers and crew. Equipment includes a Frigidaire refrigerating unit. A spacious galley is located on the main deck, forward of the engine room.

Merchant Marine Conference and Annual Propeller Convention Holds December Spotlight

"Never before has the maritime industry been presented with a more opportune occasion for the discussion of its serious problems than in the 14th Annual Convention of the Propeller Club of the United States and American Merchant Marine Conference, to be held in New Orleans December 8-11," declared Louis B. Pate, General Chairman of the Convention Committee, in announcing the names of the many outstanding speakers scheduled for the meetings. Mr. Pate is Vice President of the Mississippi Shipping Company.

"There can be no doubt," said Mr. Pate, "that those connected with the industry, and I also mean to include American shippers and exporters who use the inland water carriers to reach shipside, are keenly aware of the situations affecting their business today, as well as potential changes in the world sphere which will be profound in their application."

Rear Admiral Emory S. Land, U.S.N. (ret.), Chairman of the U. S. Maritime Commission, will be the featured speaker at the annual banquet, scheduled for the evening of December 10. Mr. T. A. Scott, of New York, President of the Propeller Club of the United States, will serve as toastmaster, and E. A. Jimison, President of the Propeller Club of New Orleans, will serve as Chairman.

For the American Merchant Marine Conference, we have such outstanding personages as **Commissioner Howard L. Vickery,** who, as Director of the Building Program of the U. S. Maritime Commission, is exceptionally well qualified to speak on "Efficiency of the New American Merchant Marine." **Charles H. C. Pearsall,** Vice President of Atlantic, Gulf & West Indies S. S. Lines, a past President of the Propeller Club of the United States, will speak on the subject of "Another Eventful Year in America's Shipping History."

"The Building Up of Our Inland Waterways for National Defense" will be the subject for an address by Lachlan Macleay, President of the Mississippi Valley Association.

Frank J. Taylor, President of the American Merchant Marine Institute, will speak on "The American Merchant Marine and Its Relation to National Defense."

A. T. Wood, President of the Lake Carriers' Association, will speak on "Great Lakes Shipping and National Defense."

Rear Admiral R. R. Waesche, Commandant of the U. S. Coast Guard, will speak on "The Coast Guard's Role in the National Defense Program."

H. Gerrish Smith, President of the National Council of American Shipbuilders, will speak on "The Part the Shipbuilding Industry is Playing in the National Defense Program."

J. Monroe Johnson, member of the Interstate Commerce Commission, will speak on "The Transportation Act of 1940."

Roger D. Papham, Chairman of the American-Hawaiian Steamship Company, will speak on "Maritime Labor."

Jesse Saugstad, Special Adviser to the Department of State on Maritime Affairs, will speak on "Our Merchant Marine in World Trade After the War."

The sessions of the Propeller Club of the United States will be held on December 9 and 11, with the American Merchant Marine Conference on December 10.

Robert H. Fouke, Chairman of the Board of Governors of the California Maritime Academy, will speak on "America Builds a Merchant Marine."

T. A. Scott, of New York, President of the Propeller Club of the United States, will preside over the sessions of that organization. J. Lewis Luckenbach, Chairman of the American Merchant Marine Conference, will call that meeting to order and introduce Commissioner Vickery, who will serve as presiding officer.

UNITED STATES MARITIME COMMISSION

Commander Howard L. Vickery, member of the Commission, has accepted an invitation to be the presiding officer of the American Merchant Marine Conference to be held in New Orleans, December 8, 9, 10 and 11.

J. Lewis Luckenbach, chairman of the American Bureau of Shipping and Chairman of the Conference Committee, extended the invitation.

GENE HOFFMAN COMPLIMENTED

Commander K. H. Donavin has just been informed that Captain T. A. Scott, President of the Propeller Club of the United States, appointed James F. Roche, director of public relations and advertising of Moore-McCormack Lines, New York, as chairman of the Committee on Public Education for the club. Mr. Roche, prior to his appointment as director of public relations and advertising for Moore-McCormack Lines, was a member of the staff of the *New York Times*.

Eugene F. Hoffman, publicity director of the American President Lines, with headquarters at San Francisco, was named as one of the ten members of the Committee of the Propeller Club, as well as David Livingstone, secretary of the Education Committee of the Los Angeles Chamber of Commerce.

The Propeller Club of the United States has embarked on a program of education of American youth in the affairs of the merchant marine and the role that shipping plays in our national life.

One of the outstanding programs in fostering this interest is the "Ship Adoption" program throughout the United States. Various public schools are adopting new ships constructed by the U. S. Maritime Commission. Recently some 17 schools in Los Angeles got behind the Propeller Club program and adopted Mormac's new Mormacstar. Captain E. H. Petrelius, master of this vessel, spoke at these schools and great interest was aroused as a consequence.

The Kerr Steamship Company announces that on November 15, 1940, *Charles Harrington* joined the organization as Vice-President. On December 1, 1939, the Kerr Steamship Company opened its own offices at New Orleans at which port Mr. Harrington represented the company for many years prior to that date.

In his new capacity, Mr. Harrington will manage the New Orleans office, and also be in active supervision of all the Gulf activities of the company.

Technical Papers

(Continued from Page 55)

indicated that on a ship speed of 23.6 knots, and a flow through condenser of 40,000 gallons a minute, the inlet scoop would produce a positive head of 9.70 feet, and the outlet scoop a negative head of —5.26 feet, or a total head due to scoops of 14.96 feet.

The usual method of calculating the resistance of the system to a flow of 40,000 gpm gave a resistance head of 15.50 feet. The scoop on trials maintained a satisfactory vacuum at the speed. These results are very close for model experiment predictions.

The authors' conclusion:

The results of the laboratory tests presented in this paper are not intended to give the final answer on the most efficient form of condenser scoops, but it is believed that enough data have been made available to enable the designer to make some improvement in the existing forms of scoops. No equipment was available for checking the effect of various forms of scoops on ship resistance, as was described by John R. Weske in the Journal *of the American Society of Naval Engineers, May, 1939. Much remains to be done in developing practical designs of scoops which will combine maximum head recovery with minimum ship resistance. Until such information is available, the authors hope that this paper will lead to a better understanding of flow conditions in scoops, and will assist designers where model tests or past practice are not available.*

(10) Feed Systems for Naval Vessels

By George B. Emerson

In a forthcoming issue of *Pacific Marine Review,* we shall publish a full abstract. The author sketches developments in high-pressure steam boiler feed systems during the last ten years, and concludes:

It is believed that the modern naval closed feed system, employing deaerating feed tanks, constitutes one of the major advances of recent years in the design of propelling machinery installations for naval vessels and, by eliminating oxygen contamination of boiler feed water, removes one of the obstacles in the path of increased main steam pressures and temperatures.

(11) A New Type of Power-Torque Meter

By Wayne C. Hall

A description and an appraisal of the value of a torque-speed meter calibrated to give readings in shaft horsepower, and developed by the Naval Research Laboratory.

Following is author's summary:

It is to be emphasized that the power-torque meter which was developed and tested to indicate either shaft torque or shaft power directly was an experimental model. At the conclusion of the tests, certain difficulties still remained, but these can be corrected.

The power-torque meter possesses certain notable advantages. The scale may be expanded for either torque or power measurements by a factor of 20 to 1 for low-scale measurements. Both forward and astern readings of either torque or power may be taken with the instrument. Instantaneous values of torque and power are obtained, which, because of the inertia of the moving system of the current meter, are averaged out over several revolutions of the shaft. Finally, a considerable advantage in the reading of a power meter is due to the relative steadiness of the meter indications, since, for a given throttle opening, the power output remains approximately constant, even though the speed and torque vary in opposite directions.

(12) Engineering Features of the Maritime Commission's Program

By J. E. Schmeltzer

A full abstract of this paper will be published in January issue of *Pacific Marine Review.*

(13) A Mercury-Propelled Cargo Ship

By W. L. R. Emmet

A carefully-worked-out proposal to apply the Emmet Mercury Vapor process to the power requirements of a U. S. Maritime Commission standard C-3 type cargo vessel.

As outlined and calculated, this proposal would result in a saving of weight of about nine tons, and some saving in space and in initial cost. Under full load operation, the plant would have an overall thermal efficiency of 31.1% and an overall fuel consumption rate of 0.443 pounds per shaft horsepower hour.

The plant would comprise two mercury boilers delivering mercury vapor at 100 psi absolute and a temperature of 907° F. to a mercury turbine which extracts from this vapor 4,750 shaft horsepower, reducing the vapor to 1.12 psi absolute and temperature of 466° F. This vapor exhausts into a condenser-boiler wherein the cooling water is raised to steam at 436° F. and 365 psi absolute. This steam is superheated in the uptakes of the mercury boilers, and arrives at the throttle of the steam turbine at 350 psi absolute and 800° F. The steam turbine extracts 4,900 shaft horsepower from the steam, and exhausts into the steam condenser at 1.5 psi absolute.

The mercury turbine operates at 1,200 rpm and the steam turbine at 4,000 rpm.

The calculated fuel rate of 0.443, as compared with the record straight steam rate of 0.545, would indicate a saving of approximately 20,000 lbs. of fuel a day on full power.

Book Review

Cable Car Days in San Francisco, by Edgar M. Kahn; 128 pages 7 by 10 inches, with many illustrations. Published by the Stanford University Press. Price $3.00, net.

It is difficult to describe in words the charm that a book like this has for its readers. Into ten short chapters the author packs an amazing amount and variety of information about the development of San Francisco and its cable car systems. The first chapter, *"San Francisco of the 'Seventies,"* sketches in swift sentences a vivid picture of the setting in which was laid the groundwork for "the first cable car system in America." A sample sentence shows the sure, graphic touch: *"With the gold fever in its joints, the city suffered from growing pains."*

Chapter Two covers *"The Horse-Car Period,"* and takes the reader back to the fifties and traces the development of transportation in the rapidly-growing metropolis.

But we are not going to tell the whole story. The author has put honest research into the compilation of factual data, and has marshalled that data with rare skill. We advise you to buy your own copy, and assure you many hours of pleasurable reminiscence as you browse through its fascinating text.

This book is also a work of art from the bookmaker's viewpoint. With half tones from many old and rare photographs, and with two-color drawings by William Wilkie made especially to illustrate the text, the publishers have produced a format that any book-lover would be glad to have in his library.

Literature of the Industry

Pumping Machinery, a twenty-page attractive catalog in white, black and red, published by the Warren Steam Pump Company, Inc.

This firm has specialized in the manufacture of fine pumps exclusively for forty-three years. Its line now includes: single-stage centrifugal pump sizes handling from 10 gpm to 5200 gpm and for discharge pressures up to 125 psi; multistage centrifugal pumps with capacities up to 3600 gpm and for discharge pressures up to 850 psi; single and duplex piston pumps up to 1600 gpm and 250 lbs. pressure in horizontal or vertical types; single and duplex plunger pumps to similar capacities; and steam heat vacuum pumps.

All of these pumps are described and illustrated in this catalog. Skeleton specifications, dimensions and performances are fully recorded to prove the truth of the basic idea that Warren builds pumps to suit the customer's requirement, whether that be "a torrent or a trickle."

Single-Stage-Double-Suction Centrifugal Pumps, Bulletin 225-1, Warren Steam Pump Company, Inc.

A six-page pamphlet describing and dimensioning Warren Type DB and DS single-stage double-suction centrifugal pumps. Specifications are given covering all parts of these pumps. Tables of dimensions, capacities at various heads, and motor horsepower required are all set forth in compact, easily-understood form.

Realwear Chromized Piston Pumps. This four-page bulletin published by Warren Steam Pump Company, Inc., describes duplex reciprocating steam pumps for boiler feed or for light pressure service operating at 200 to 225 psi steam pressure and discharging on the pump side at up to 200 lbs. for large sizes and up to 250 lbs. for 6-inch size and smaller.

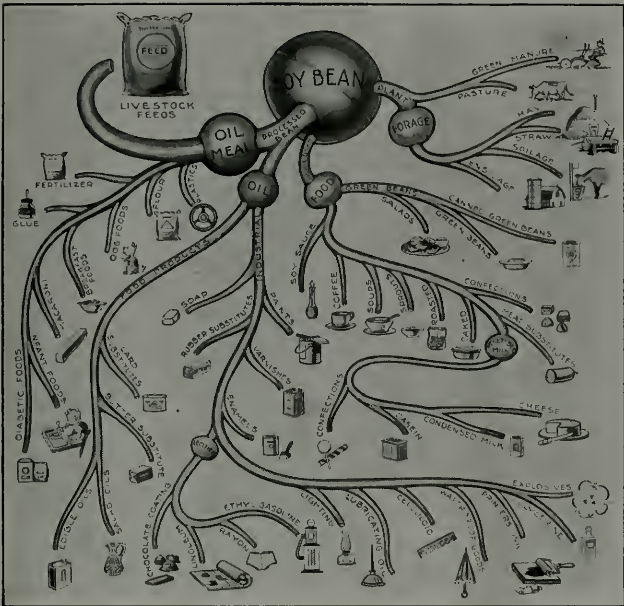
Diesel Marine Engines, a thirty-two-page booklet (Form 6196) just issued by Caterpillar Tractor Co., lists the capacities and mechanical features of each of the eight sizes of "Caterpillar" diesel marine engines.

Unusually complete from both a technical and application point of view, the booklet is printed in three colors, and profusely illustrated with installation pictures and cutaway photographs or drawings.

The first few pages of text are devoted to a description of the design and construction of the engines. The central portion of the book contains three-color cutaway photographs of each engine type, showing the cooling and lubricating systems, and pointing out each mechanical feature mentioned in the text. The third section gives ratings, specifications, performance charts and line dimensional drawings for installation purposes.

Eight sizes of diesel-electric sets for marine use are also listed, and lastly there is a description of service facilities available to "Caterpillar" owners throughout the world.

Flexarc Welders, Descriptive Data 26-100, a new 12-page illustrated booklet giving valuable facts about welders and their operation, is announced by the Westinghouse Electric & Manufacturing Company. Covered in the booklet are motor- and engine-driven welders, and bare welding generators.



Everything "from hay to hairpins" are now common uses for the versatile soybean. And today competition is keen in industrial laboratories to discover new adaptations of this "wonder bean."

CHAPTER XXXVIII
ON AMERICAN COMMERCE

SOYBEAN

One of the oldest crops known to man is the soybean. Before written history, the Chinese developed the uses of the bean for human food, but not until only a score of years ago was the value of the plant as food for land and animals discovered.

In the past decade the soybean has burst forth in this country as a magic plant—the "wonder bean" with virtually "a thousand and one" uses in agriculture, industry, and the home. Led by Illinois, Indiana, Iowa, Ohio, and North Carolina, but with acreage in 22 other states, with processing plants in additional states as well, approximately 79,689,000 bushels of soybeans were produced in 1939, one-third of the entire world's supply, value over $100,000,000. The great $10,000,000 soy crop in Bessarabia, originally planned by Germany for explosives, will now be used by Russia to help forestall her famine.

The soybean is valuable as a forage crop, doubly valuable as an improver of soils deficient in nitrogen, and even vastly more valuable in its contribution to a better living for all Americans.

The McCormick Steamship Company annually transports thousands of tons of soybeans and their products. We are specially equipped to handle your shipments too, bulk or packaged, with care and dispatch. Specify McCormick for your orders Westbound, intercoastal, Pacific Coastwise, and to Puerto Rico.

McCORMICK STEAMSHIP COMPANY

EFFICIENCY AND OPERATING COSTS

Are largely dependent upon the quality of material in the wearing parts of the cylinders.

For increased engine efficiency, low fuel consumption and maintenance costs, apply liners, pistons and piston rings of HUNT-SPILLER AIR FURNACE GUN IRON.

Steam or Diesel — H. S. G. I. parts, either rough or finished, supplied for any type of engine.

HUNT-SPILLER MFG. CORPORATION

383 Dorchester Ave. South Boston, Mass.

V. W. ELLET Pres. & Gen. Mgr. 383 Dorchester Ave.	E. J. FULLER Vice President South Boston, Mass.
N. B. Robbins 1920 Clemens Rd. Oakland, Calif.	Thos. G. Baird 16 California Street KE-1142 San Francisco

HUNT-SPILLER *Air Furnace* GUN IRON

PROGRESS IN *American Shipyards*

Pacific Coast

BASALT ROCK CO., INC.
Napa, Calif.

New Construction:

Eight steel open lighters; owner, Bureau of Supplies and Accounts, Navy Dept., Washington, D. C. Delivery at Mare Island. 110' x 34' x 11'3". Contract awarded September 5, 1940.

Eight steel seagoing 1000-ton cargo barges; contractors, Pacific Navy Air Bases. Delivery at San Francisco Bay. 150' x 40' x 12'. Contract awarded November 15, 1940.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
(Union Plant)
San Francisco, Calif.

New Construction:

Hulls Nos. 5360-5364, five C-1 cargo vessels for U. S. Maritime Commission. 395' x 60' x 37'6"; 6400 gross tons each; 4000 hp. Full scantling steam propulsion type. Keels laid, No. 5362, August 8, 1940; No. 5363, October 9, 1940. Launching dates, No. 5360, August 6, 1940; No. 5361, October 4, 1940.

Eighteen 2100-ton destroyers for U. S. Navy.
Two 1650-ton destroyers for U. S. Navy.
Four 6000-ton cruisers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
San Pedro, Calif.

New Construction:

Six 2100-ton destroyers for U. S. Navy.

COMMERCIAL IRON WORKS
Portland, Ore.

New Construction:

Four anti-submarine net tenders.

CONSOLIDATED STEEL CORP., LTD.
Los Angeles, Calif.

New Construction:

Hulls Nos. 156-159, four C-1-BT, full scantling, turbine propulsion cargo vessels for U. S. Maritime Commission. **Launching dates, No. 156, November 14, 1940;** February 19, April 28 and July 24, 1941; delivery dates March 3, June 2, September 4 and November 4, 1941.

FELLOWS AND STEWART, INC.
Wilmington, Calif.

Conversion:

Remodeling purse seiners for U. S. Navy.

GENERAL ENGINEERING & DRY DOCK CO.
Alameda, Calif.

Drydock and Routine Repairs:

Foy Derrick Barge, Haviside Barge No. 2, Bundeson & Lauritzen Barge No. 2, Tug Arabs, Lightship No. 83, Motormates; U. S. S. Dreadnaught and Eider; Lake Miraflores; Purse Seiners Santa Rita, St. Joseph, Joe Di Maggio and Solano.

HARBOR BOAT BUILDING CO.
Terminal Island, Calif.

New Construction:

Hull No. 65, tuna bait boat for Van Camp Sea Food and Balestreri partners. Length 100', breadth 25', depth 11'; 150 gross tons; Fairbanks-Morse diesel, 300 hp; 10 knots speed; cost $160,000. Launched October 6, 1940; **delivery date December 1, 1940.**

LAKE UNION DRY DOCK & MACHINE WORKS
Seattle, Wash.

Conversion:

City of Newport News conversion to transport. Completion date December 23, 1940.

LAKE WASHINGTON SHIPYARDS
Houghton, Wash.

New Construction:

Four anti-submarine net tenders.
1000 A. S. N. T. floats.
Coast and Geodetic Survey ship.
Six seaplane tenders for U. S. Navy.

MARE ISLAND NAVY YARD
Mare Island, Calif.

New Construction:

SS203, Tuna, submarine. Launched October 2, 1940.

SS211, Gudgeon, submarine. Keel laid November 22, 1939.

AS11, Fulton, submarine tender. Keel laid July 19, 1939.

YO44 and YO45, two fuel barges. Keel laying date, No. YO45, October 9, 1940; launching date, No. YO44, September 17, 1940.

YSD14, seaplane wrecking derrick. Launching date November 1, 1940.

AS12, Sperry, submarine tender. Order placed June 12, 1940.

SS236, Silversides, submarine. Keel laying date November 4, 1940.

Trigger (SS237), Waboo (SS238) and Whale (SS239); three submarines. Order placed June 28, 1940.

SS281 and SS282, two submarines. Order placed September 9, 1940.

AS15 and AS16, two submarine tenders. Order placed October 3, 1940.

Three submarine tenders, eight submarines, two fuel barges, seaplane wrecking derrick.

MOORE DRY DOCK CO.
Oakland, Calif.

New Construction:

Hull No. 196, Mormacstar, cargo vessel for U. S. Maritime Commission. LOA 492'0", LBP 465', breadth molded 69'6", depth molded 42'6"; shp normal 8500, shp max. 9350; dis. 17,600 tons; deadweight 11,926 tons; steam turbine propelled. **Estimated delivery date December 31, 1940.**

Hulls Nos. 197, Mormacsea, and 198, Mormacsun; two C-3 vessels for U. S. Maritime Commission. LOA 492'0", LBP 465', breadth molded 69'6", depth molded 42'6". Estimated delivery dates January 23 and March 24, 1941.

Hull No. 199, caisson gate for Drydock No. 2, Pearl Harbor, Bureau of Yards and Docks. 150' long, 22' beam, 57' high. Keel laid August 12, 1940.

Hulls Nos. 201-203, three cargo and passenger vessels for Alcoa Steamship Co. 442' x 62' x 25'; depth molded to bridge deck 41'6"; 8500 hp; 17 knots speed; passenger carrying capacity 38. Estimated keel laying dates February 3, June 16 and September 10, 1941. Estimated delivery dates January 1, March 15 and June 1, 1942.

Three steel barges for Dravo Corporation. 110' x 34' x 11'3" molded depth; 2 diesel-driven generators.

OLSON & SUNDE MARINE WORKS
Seattle, Wash.

New Construction:

Two twin-screw speed mackerel fishing vessels. 40' x 10' x 6'; 10 tons capacity.

Boat powered with two 80-hp converted Buick engines. Estimated speed 25 mph.

Boat powered with two 80-hp converted Packard engines. Estimated speed 25 mph.

PACIFIC DRY DOCK & REPAIR CO.
Oakland, Calif.

New Construction:

One all-welded steel oil barge. 148' x 38' x 9'; 300,000 gal. capacity.

THE PUGET SOUND NAVY YARD
Bremerton, Wash.

New Construction:

DD436, Monssen, destroyer. Launched May 16, 1940.

YT139, Ala. Launched November 6, 1939.

AVP10, Barnegat, seaplane tender. Keel laid October 27, 1939.

AVP11, Biscayne, seaplane tender. Keel laid October 27, 1939.

AVP10, Casco, seaplane tender. Keel laid May 30, 1940.

AVP13, Mackinac, seaplane tender. Keel laid May 30, 1940.

YSD15, seaplane wrecking derrick. Keel laid September 10, 1940.

Ships authorized: DD480, Halford; DD481, Leutze; DD592-DD597, eight destroyers; YSD18, YSD24, YSD26, four seaplane wrecking derricks.

SEATTLE-TACOMA SHIPBUILDING CORP.
Seattle, Wash.

TACOMA PLANT

New Construction:

Hulls Nos. 1-2; 3, Cape Cleare; 4-5; five C-1 cargo vessels for U. S. Maritime Commission. Single screw, full scantling diesel propulsion type. Two General M.A.N. 2100-hp engines; 14 knots speed. Keel laying date, No. 5, February 10, 1941. Launching dates, No. 3, November 30, 1940; No. 4, February 1, 1941; No. 5, May 1, 1941. Delivery dates, No. 1, January 1, 1941; No. 2, February 1, 1941; No. 3, June 1, 1941; No. 4, July 1, 1941; No. 5, October 1, 1941.

Hulls Nos. 6-9, four C-3 cargo ships for U. S. Maritime Commission. 465' x 69'6" x 33'; 8900 tons; 8500-hp steam turbine propulsion; cost $2,990,000.

Hulls Nos. 10-11, two C-3 shelter deck type cargo steamers for U. S. Maritime Commission. To be converted on completion to U. S. Navy troop ships.

SEATTLE PLANT

New Construction:

Twenty destroyers for U. S. Navy.

WESTERN BOAT BUILDING CO., INC.
Tacoma, Wash.

New Construction:

Hull No. 144, purse seine fishing boat. 95' x 24'; for stock. Keel laid September 10, 1940.

Hull No. 145, fishing boat. 115' x 26'. Keel laid October 1, 1940.

Conversion:

Fishing boat Majestic conversion to naval use.

WESTERN PIPE AND STEEL CO.
South San Francisco, Calif.

New Construction:

Hulls Nos. 57-61, five C-1 cargo vessels for U. S. Maritime Commission. Full scantling diesel propulsion type; single screw; two Busch-Sulzer 2100-hp engines. Keel laying date, No. 61, December 23, 1940 (est.). Launching dates, August 8, October 8, December 17, 1940 (est.); February 15 and April 22, 1941 (est.). Delivery dates, January 16, March 17, May 16, July 15 and September 13, 1941.

Hulls Nos. 62-65, four C-3 cargo ships for U. S. Maritime Commission. 492' x 69' x 42'6"; 8900 tons; 8500-hp; steam propulsion; $2,990,000 each.

Atlantic, Lakes, Rivers

AMERICAN BRIDGE COMPANY
Pittsburgh, Pa.

New Construction:

Fifteen freight barges for Inland Waterways Corp., St. Louis, Mo. 280' x 48' x 11'.

THE AMERICAN SHIP BUILDING CO.
Cleveland, Ohio

New Construction:

Twelve net tenders for U. S. Navy (6 at Lorain, Ohio; 6 at Cleveland, Ohio). 151'8" x 30'6" x 16'6"; diesel-electric propulsion; contract price $6,357,000. Keels laid October 18, 1940.

BATH IRON WORKS
Bath, Maine

New Construction:

Hull No. 181, DD430, Eberle; 1620-ton destroyer for U. S. Navy. Delivery date December, 1940.

Hulls Nos. 182-183, DD437, Woolsey; and DD438, Ludlow; two 1620-ton destroyers for U. S. Navy. Delivery dates May and July, 1941.

Hulls Nos. 184-187, four cargo ships for American Export Line. 400' x 60' x 39'. Delivery dates September and October, 1941, and April and June, 1942.

Hulls Nos. 188-189, DD457 and DD458, two destroyers for U. S. Navy. Delivery dates December, 1941, and February, 1942.

Hulls Nos. 190-195, DD449-451, 467-469, six destroyers for U. S. Navy.

Hulls Nos. 196-206, DD507-DD517, eleven destroyers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Fore River Yard
Quincy, Mass.

New Construction:

Hull No. 1478, Massachusetts, 35,000-ton battleship for U. S. Navy. Keel laid July 20, 1939.

Hulls Nos. 1479, San Diego; and 1480, San Juan; two 6000-ton cruisers for U. S. Navy. Keels laid March 27 and May 15, 1940.

Hull No. 1484, cargo vessel for U. S. Maritime Commission. 450' x 66' x 42'3"; 16½ knots; geared turbines and water tube boilers; 14,500 tons. Launching date November 16, 1940.

Hulls Nos. 1485-1487, three tankers. 502' x 68' x 37'; 21,000 tons. Keels laid July 1, August 7 and September 26, 1940.

Hulls Nos. 1488-1491, four tankers for Sinclair Refining Co. 10,700 tons dwt.

Hulls Nos. 1492-1493, two tankers for Sinclair Refining Co. 15,450 tons dwt.

Hulls Nos. 1494-1497, four heavy cruisers for U. S. Navy.

Hulls Nos. 1498-1501, four light cruisers for U. S. Navy.

Hulls Nos. 1502-1503, two light cruisers for U. S. Navy.

Hulls Nos. 1504-1507, four heavy cruisers for U. S. Navy.

Hulls Nos. 1508-1511, four aircraft carriers for U. S. Navy.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Sparrows Point Yard
Sparrows Point, Md.

New Construction:

Hull No. 4339, Deltargentino, passenger and cargo ship for Mississippi Shipping Co.

Hulls Nos. 4341, Robin Locksley; 4342-4343; three cargo vessels for Seas Shipping Co. LOA 485', LBP 450', beam 66', draft 43'. Launching date, No. 4341, October 5, 1940.

Hulls Nos. 4344, James Lykes; 4345, Lipscomb Lykes; 4346-4348; five C-1 cargo vessels. LOA 417, LBP 395', beam 60', depth 37'6". Launching dates, No. 4344, July 27, 1940; No. 4345, September 7, 1940.

Hulls Nos. 4350-4352, three cargo vessels for Seas Shipping Co. 450' x 66' x 34'; 6300 hp; 8500 gross tons.

Hulls Nos. 4353-4356, four oil tankers for Socony Vacuum Oil Co. 487'6" x 68' x 37'; 12,000 hp; 9,800 gross tons.

Hull No. 4357 oil tanker for Union Oil Co. of Calif. 442' x 63' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4358-4359, two oil tankers for Socony Vacuum Oil Co. 487'6" x 68' x 37'; 12,000 hp; 9800 gross tons.

Hulls Nos. 4360-4361, two oil tankers for Union Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4362-4364, three cargo and passenger vessels for Mississippi Shipping Co. 465' x 65'6" x 39'9"; 8600 hp; 8300 gross tons.

Hull No. 4365, oil tanker for Richfield Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

Hulls Nos. 4367-4368, two oil tankers for Panama Transport Co. 487'6" x 68' x 37'; 7000 hp; 9800 gross tons.

Hull No. 4369, oil tanker for Continental Oil Co. 442' x 64' x 34'10"; 3500 hp; 8000 gross tons.

BETHLEHEM STEEL COMPANY, INC.
Shipbuilding Division
Staten Island Yard
Staten Island, N. Y.

New Construction:

Hulls Nos. 8015-8019, five C-1-B design cargo vessels for U. S. Maritime Commission. 417'9" x 60' x 37'5". Launching dates, No. 8016, November 2, 1940; No. 8017, January 1, 1941; No. 8018, March 15, 1941; No. 8019, April 15, 1941. Delivery dates April 1, June 1, August 1 and November 1, 1941, and January 1, 1942.

Hulls Nos. 8021-8022, two destroyers for U. S. Navy.

Hulls Nos. 8023-8032, ten destroyers for U. S. Navy.

BOSTON NAVY YARD
Boston, Mass.

New Construction:

DD433, Gwin, 1600-ton destroyer. Completion date March 1, 1941.

DD434, Meredith, 1600-ton destroyer. Completion date May 1, 1941.

DD441, Wilkes, 1600-ton destroyer. Completion date July 1, 1941.

DD442, Nicholson, 1600-ton destroyer. Completion date September 1, 1941.

DD461, 1600-ton destroyer. Completion date February 12, 1942.

DD462, 1600-ton destroyer. Completion date April 12, 1942.

DD472, 1600-ton destroyer. Completion date March 1, 1943.

DD473, 1600-ton destroyer. Completion date May 1, 1943.

DD474, 1600-ton destroyer. Completion date July 1, 1943.

DD475, 1600-ton destroyer. Completion date September 1, 1943.

DD476, 1600-ton destroyer. Completion date January 1, 1943.

AVP21, Humboldt, seaplane tender. Completion date October 12, 1941.

AVP22, Matagorda, seaplane tender. Completion date December 12, 1941.

YSD11, seaplane wrecking derrick. Completion date November 15, 1940.

YSD20, seaplane wrecking derrick. Completion date May 1, 1941.

YSD22, seaplane wrecking derrick. Completion date January 1, 1941.

YSD23, seaplane wrecking derrick. Completion date March 1, 1941.

BROOKLYN NAVY YARD
Brooklyn, N. Y.

New Construction:

BB 55, North Carolina, battleship. LBP 714'0", beam to outside armor 108'0"; std. displ. 35,000 tons; geared turbine engines; express type boilers. Contract delivery date September 1, 1941; estimated delivery date, October 15, 1941.

BB 61, Iowa, battleship. LOA 880", beam 108'; 4500 tons standard displacement; geared turbines. Contract delivery date August 1, 1943.

BB 63, Missouri, battleship. LOA 880', beam 108'; 4500 tons standard displacement; geared turbines. Order placed June 12, 1940.

IRA S. BUSHEY & SONS, INC.
Brooklyn, N. Y.

New Construction:

Hull No. 486, tug. 100'; 805-hp F-M diesel.

Hull No. 490, tug. 90'; 805-hp F-M diesel.

Hull No. 491, wooden drydock section for Bethlehem Steel Co. Delivery date 150 days.

Hull No. 493, tug. 100'; 805-hp F-M diesel.

Hull No. 494, tug. 90'; 805-hp F-M diesel.

DEFOE BOAT & MOTOR WORKS
Bay City, Mich.

New Construction:

Hull No. 167, PC452, sub-chaser for U. S. Navy. 174' long. Delivery date May, 1941.

Hulls Nos. 168-170, YT145-YT148, three harbor tugs for U. S. Navy. 100′ long. Delivery date February, 1941.

Hulls Nos. 171-174, four mine sweepers for U. S. Navy. 220′ long.

THE DRAVO CORPORATION
Engineering Works Division

Pittsburgh, Pa., and Wilmington, Del.

New Construction:

Hull No. 1659, welded steel oil barge for Pacific Dry Dock & Repair Co., San Francisco, Calif. 148′ x 38′ x 9′; 426 gross tons.

Hulls Nos. 1699-1701, three welded carfloats for Pennsylvania R. R., Philadelphia, Pa. 250′ x 34′ x 9′1″; 1782 gross tons.

Hulls Nos. 1734-1735, two type W-7 welded bulk cargo barges for stock. 175′ x 26′ x 10′8″; 944 gross tons.

Hulls Nos. 1740-1749, ten type W-7 welded coal barges for stock. 175′ x 26′ x 10′8″; 4720 gross tons.

Hull No. 1750, 1300-hp twin-screw diesel towboat for stock. 176′ x 36′ x 10′; 590 gross tons.

Hull No. 1751, 760-hp twin-screw diesel towboat for stock. 145′ x 27′ x 11′9″; 318 gross tons.

Hulls Nos. 1752-1756, five welded steel oil barges for stock. 195′ x 35′ x 9′9″; 2990 gross tons.

Hulls Nos. 1757-1759, three welded coal barges for M. & J. Tracy, Inc., New York City. 134′ x 34′ x 17′; 2301 gross tons.

Hulls Nos. 1761-1767, seven welded sand and gravel barges, deck type, for Warner Co., Philadelphia. 130′ x 34′ x 10′; 3164 gross tons.

Hulls Nos. 1768-1775, three steel lighters for U. S. Navy Dept., Washington, D. C. 110′ x 34′ x 11′3″; 2672 gross tons.

Hulls Nos. 1776-1780, five covered cargo barges for stock. 175′ x 26′ x 11′; 2650 gross tons.

Hulls Nos. 1781-1784, four covered cargo barges for River Terminals Corp., New Orleans. 2612 gross tons.

Hulls Nos. 1785-1790, six sand and gravel barges for Keystone Sand Division. 135′ x 27′ x 8′; 1530 gross tons.

Hulls Nos. 1791-1795, five covered cargo barges for stock. 175′ x 26′ x 11′; 2650 gross tons.

Hull No. 1796, deck barge for Arundel Corp., Baltimore, Md. 110′ x 34′ x 11′3″; 334 gross tons.

ELECTRIC BOAT CO.
Groton, Conn.

New Construction:

Hull No. 39, Gar (SS206). Standard displacement 1475 tons. **Launched November 7, 1940.**

Hull No. 40, Grampus (SS207). Standard displacement 1475 tons. Keel laid February 14, 1940.

Hull No. 41, Grayback (SS208). Standard displacement 1475 tons. Keel laid April 3, 1940.

Hull No. 42, Mackerel (SS204). Standard displacement 800 tons. Launched September 28, 1940.

Hull No. 42, Gato (SS212). Standard displacement 1500 tons. Keel laid October 5, 1940.

Hull No. 43, Greenling (SS213). Keel laid November 12, 1940.

Hull No. 44, Grouper (SS214). Keel laying date December 28, 1940.

Hulls Nos. 45 to 57 (SS215-SS221; SS253-SS258). Standard displacement 1500 tons.

Hulls Nos. 58-82. Standard displacement 1500 tons.

THE FEDERAL SHIPBUILDING AND DRY DOCK COMPANY
Kearny, N. J.

New Construction:

Hull No. 167, C-3 cargo vessel for U. S. Maritime Commission. **Launched November 16, 1940.**

Hulls Nos. 168-169, CL51, Atlanta; and CL52, Juneau; two 6000-ton cruisers for U. S. Navy. Keels laid April 22 and May 27, 1940.

Hulls Nos. 170, Edison; and 171, Ericsson; two torpedo boat destroyers for U. S. Navy. **Launched November 23, 1940.**

Hulls Nos. 174-176, three C-1 cargo vessels for U. S. Maritime Commission. Keel laid, No. 176, August 12, 1940. **Launching dates, Nos. 174-175, November 2, 1940.**

Hulls Nos. 179-186, eight C-2 cargo ships for U. S. Maritime Commission.

Hulls Nos. 187-188, two cargo vessels for Matson Navigation Co.

Hull No. 189, one tanker for Pan American Petroleum and Transport Co. 13,000 dwt tons.

Hulls Nos. 190-193, four tankers for Sinclair Refining Co. 15,000 dwt.

Hulls Nos. 194-197, four destroyers for U. S. Navy.

Hulls Nos. 198-203, six destroyers for U. S. Navy.

Hulls Nos. 204-205, two destroyers for U. S. Navy.

GULF SHIPBUILDING CORP.
Chickasaw, Ala.

New Construction:

Four 2100-ton destroyers for U. S. Navy.

GULFPORT BOILER & WELDING WORKS, INC.
Port Arthur, Texas

New Construction:

Hulls Nos. 167-168, two diesel-electric tugs for General Motors Corp. 100′ x 24′ x 12′4″; 1000 shp G. M. diesel and auxiliary each. Delivery dates, No. 167, March, 1941; No. 168, April, 1941.

Hull No. 157, diesel tug for U. S. Navy. 70′ x 18′ x 10′3″; 400-hp Atlas diesel and auxiliary. **Delivery date December 15, 1940.**

Hull No. 165, oil barge for E. Eggers Towing & Transp. Co., Houston, Texas. 135′ x 30′ x 8′. **Delivered November 9, 1940.**

Hull No. 166, oil barge for G. B. Zigler Co., Jennings, La. 205′ x 40′ x 10′. **Delivered November 30, 1940.**

Hull No. 169, oil barge for Edwards Transportation Co., Houston, Tex. 100′ x 28′ x 7′. **Delivered November 20, 1940.**

Hull No. 170, deckload barge for Brown & Root, Houston, Tex. 80′ x 24′ x 5′. **Delivered November 1, 1940.**

Hull No. 171, oil barge for stock. 100′ x 26′ x 8′. **Delivered October 15, 1940.**

THE INGALLS SHIPBUILDING CORP.
Pascagoula, Miss., and Decatur, Ala.

New Construction:

Hulls Nos. 253 to 256, four C-3 cargo vessels. Completion dates November, 1940; and January, March and May, 1941.

Hulls Nos. 268, 297, 298, three C-3 IN passenger and cargo vessels for U. S. Lines.

One oil tanker for Husky Transit Corp., Minneapolis, Minn. 235′ x 35′ x 14′. Estimated completion date January 3, 1941.

One derrick barge for Dunbar & Sullivan Dredging Co., Detroit, Mich. 100′ x 43′ x 10′. **Completion date November 1, 1940.**

Three steam turbine vessels for American-South African Lines. 492′ long, 69′6″ beam; 9500 shp; 18,000 ton dis.; 19 knots speed.

Hulls Nos. 265-267, three C-3-P cargo and passenger vessels for American-South African Lines. 492′ x 69′6″; 9500 shp; 18,000 tons dis.; 16½ knots speed. Completion dates November 15 and December 16, 1941; and January 15, 1942.

Hulls Nos. 283, 294-296, four C-3-S-A1 cargo vessels for U. S. Maritime Commission. Completion dates February 17, March 29, May 8 and June 17, 1942.

Three oil barges for Tropical Oil Co. 125′ x 30′ x 7′. **Completion date December 1, 1940.**

One oil barge for Goyer Oil Co., Greenville, Miss. 135′ x 33′ x 7′9″. Completion date January 15, 1941.

LEVINGSTON SHIPBUILDING CO.
Orange, Texas

New Construction:

Hull No. 155, tug for Higman Towing Co. 85′ x 24′ x 9′11″; 600-hp Cooper-Bessemer engine.

Hull No. 160, tug for General Motors Corp. 85′ x 22′ x 9′; 800-hp General Motors engine.

Hull No. 186, tug for stock. 74′ x 20′ x 9′; 400-hp Atlas diesel engine.

Hulls Nos. 187-188, two tugs for River Terminals Corp. 85′ x 23′ x 9′6″; 600-hp Cooper-Bessemer engines.

Hull No. 189, oil barge for stock. 205′ x 40′ x 10′; for B grade cargo; 13,000 bbls.

MANITOWOC SHIP BUILDING CO.
Manitowoc, Wis.

New Construction:

One steel twin-screw carferry. 406′ x 57′ x 23.5′. Approximate delivery date, January 4, 1941.

One steel twin-screw diesel towboat. 140′ x 35′ x 8′6″. **Delivery date, November, 1940.**

JOHN H. MATHIS CO.
Camden, N. J.

New Construction:

Four anti-submarine net tenders for U. S. Navy.

One bulk carrier tanker 265′ long for Thos. Bowes, N. A.

THE NEW YORK SHIPBUILDING CORPORATION
Camden, N. J.

New Construction:

AV4, Curtiss, seaplane tender for U. S. Navy. Launched April 20, 1940.

AV5, Albemarle, seaplane tender for U. S. Navy. Keel laid June 12, 1939.

BB57, South Dakota, battleship for U. S. Navy. Keel laid July 5, 1939.

AR5, Vulcan, repair ship for U. S. Navy. Keel laid December 26, 1939.

CL55, Cleveland; and CL56, Columbia; two cruisers for U. S. Navy. Order placed March 23, 1940.

CL57 and CL58, two cruisers for U. S. Navy. Order placed June 12, 1940.

AV7, Currituck, seaplane tender for U. S. Navy.

CL59-CL61, three cruisers for U. S. Navy.

CB1-CB6, six cruisers for U. S. Navy.

CL76, four cruisers for U. S. Navy.

NEWPORT NEWS SHIPBUILDING & DRYDOCK CO.
Newport News, Va.

New Construction:

Hull No. 372, Esso Columbia, oil tanker for Standard Oil Company of New Jersey. Gross tonnage about 11,500 tons; LBP 525′, breadth molded 75′, depth molded 39′. Launched September 18, 1940.

Hull No. 378, battleship 58, Indiana, for U. S. Navy. Keel laid November 20, 1939.

Hulls Nos. 379-384, six single screw combination passenger and cargo vessels for U. S. Maritime Commission. 465′ x 69′6″ x 42′6″; gross tonnage about 9100 tons. Keels laid, No. 382, February 5, 1940; No. 383, June 10, 1940; No. 384, August 12, 1940. Launching dates, No. 379, June 7, 1940; No. 380, August 7, 1940; No. 381, October 4, 1940.

Hull No. 385, aircraft carrier No. 8, Hornet, for U. S. Navy. Keel laid September 25, 1939.

Hull No. 386, single-screw combination passenger and cargo vessel for U. S. Maritime Commission. 465′ x 69′6″ x 42′6″; gross tonnage about 9100 tons. Delivery date May, 1941.

Hulls Nos. 387-388, two single-screw cargo vessels for Matson Navigation Co. 465' x 69'6" x 42'6"; gross tonnage about 7,700. Keel laid, No. 387, August 12, 1940. Delivery dates May 25 and July 1, 1941.

Hull No. 389, one single-screw cargo vessel for International Freighting Corp., Inc. 435' x 63' x 40'6"; gross tonnage about 8,000. Delivery date August 1, 1941.

Hulls Nos. 390-391 (CL62-CL63), two light cruisers for U. S. Navy.

Hulls Nos. 392-394 (CV9-CV11), three aircraft carriers for U. S. Navy.

Hulls Nos. 395-398 (CV12-CV15), four aircraft carriers for U. S. Navy.

Hulls Nos. 399-400 (CL80-CL81), two light cruisers for U. S. Navy.

PORTSMOUTH NAVY YARD
Portsmouth, N. H.

New Construction:

Submarines SS201, Triton; SS202, Trout; SS209, Grayling; SS210, Grenadier; SS205, Marlin; SS228-SS235.

THE PUSEY & JONES CORP.
Wilmington, Del.

New Construction:

Hull No. 1074, automobile and passenger ferry for Virginia Ferry Corp. 300' x 65' x 20'; 1600 gross tons; steam Una-Flow propulsion; 3600 hp; 16 knots speed; cost $1,000,000. **Delivery date December 30, 1940.**

Hulls Nos. 1075 and 1076, two C-1 cargo vessels for U. S. Maritime Commission; 413' x 60' x 37'6"; 5000 gross tons; turbine propulsion; 4000 hp; 14 knots speed; cost $1,928,000. Delivery dates January 15 and March, 1941.

Hull No. 1079, tug for Long Island R. R. Co. 105' x 24' x 12'11"; 210 gross tons; Una-Flow steam machinery; 800 shp; 11 knots speed. **Launching date November 15, 1940; delivery date December 16, 1940.**

Hulls Nos. 1080-1081, two automobile and passenger ferries for Delaware-New Jersey Ferry Co. 206' x 65' x 16'; 750 gross tons; Una-Flow steam machinery; 1400 shp; 15 mph speed. Launching date February 1, 1941.

SUN SHIPBUILDING AND DRY DOCK COMPANY
Chester, Pa.

New Construction:

Hulls Nos. 186-189, four C-3 single-screw combination passenger and cargo vessels. 465' x 69'6" x 42'6"; diesel propelled; equipped with Sun-Doxford engines. Delivery dates May, July, August and October, 1941.

Hull No. 193, one tanker for Standard Oil Co. of Calif. 375' x 57' x 29'; 7000 dwt tons. **Delivery date December, 1940.**

Hull No. 197, tanker for Standard Oil Co. of N. J. 18,000 dwt. **Delivery date, December, 1940.**

Hull No. 196, one tanker for Sun Oil Co. 18,000 tons. **Delivered November 9, 1940.**

Hull No. 198, one tanker for Texas Co. 13,785 tons. **Delivery date December, 1940.**

Hulls Nos. 199-206, eight cargo vessels for U. S. Maritime Commission. 7500 tons. Delivery dates June, August, October, December, 1941; January, March, May, July, 1942.

Hull No. 207, diesel tanker for Panama Transport Co. 18,000 dwt. Delivery date August, 1941.

Hulls Nos. 208-210, three tankers for Petroleum Shipping Co. 16,400 dwt; steam turbine. Delivery dates October, December, 1941; February, 1942.

Hull No. 211, tanker for Atlantic Refining Co. 19,400 tons. Delivery date August, 1941.

Hull No. 212, tanker for Sun Oil Co. 18,000 tons. Delivery date June, 1941.

Hulls Nos. 213-216, four tankers for Panama Transport Co. 18,000 tons; steam turbine. Delivery dates March, July and September, 1942; and March, 1943.

Hulls Nos. 219-220, two diesel tankers for Panama Transport Co. 18,000 dwt. Delivery dates March and June, 1944.

Hulls Nos. 221-222, two tankers for Keystone Tankship Corp. 16,400 tons; steam turbine. Delivery dates June and July, 1942.

Hulls Nos. 223-225, three 16-knot tankers for The Texas Co. Single-screw steam turbine; 13,285 tons dwt. Delivery dates August, September and October, 1942.

Hull No. 226, tanker for Kaymar Tankers, Inc. 16,400 tons; steam turbine. Delivery date November, 1942.

Hulls Nos. 227-228, two tankers for Seamar Tankers, Inc. 16,400 tons; steam turbine. Delivery dates January and February, 1943.

Hull No. 229, tanker for Atlantic Refining Co. 19,400 tons. Delivery date September, 1941.

TAMPA SHIPBUILDING CO.
Tampa, Fla.

New Construction:

Hulls Nos. 34-36, three C-2 type cargo vessels for U. S. Maritime Commission. 459' x 63' x 31'6"; 9291 dwt tons; diesel powered. **Delivery dates, No. 34, November 15, 1940; No. 35,** January, 1941; No. 36, February, 1941.

Hulls Nos. 37-40, four C-2 type cargo vessels for U. S. Maritime Commission. 459' x 63' x 31'6"; 9291 dwt tons.

New Unit Fairbanks-Morse Diesel Engine Line

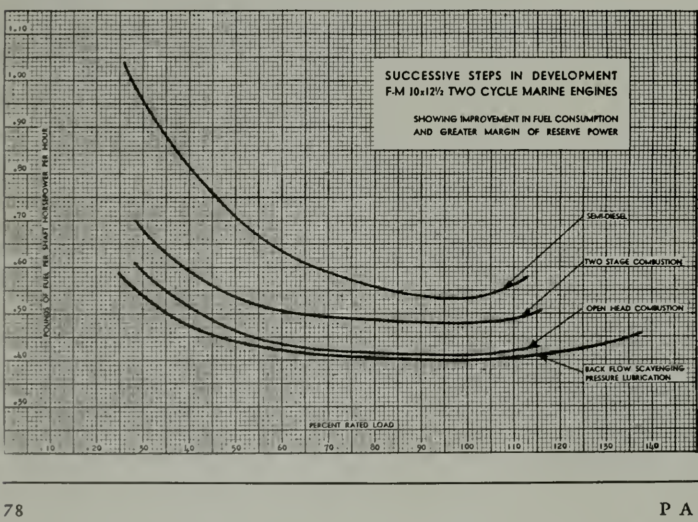
Fairbanks-Morse has further enlarged its well-known two-cycle heavy-duty line of Model 35 marine diesel engines by adding a 320-hp size. This eight-cylinder engine is of the two-cycle, full diesel solid injection design, and, like others of the 10 x 12½ bore and stroke, rates at 40 hp per cylinder at 400 rpm.

As is true of all of the Model 35 marine diesels, the new model employs what is termed the "backflow scavenging" principle. This improved system of scavenging, together with a refined fuel injection system, makes possible fuel consumptions of .40 pounds per shaft horsepower and lower.

The piston is of the trunk type, long in proportion to its diameter for maximum durability, and fitted with six compression rings and one oil scraper ring. Piston pin bearings are of the needle roller type.

The crankshaft is drilled for pressure lubrication. Lubrication is of the dry sump type, and both reversible rotary lubricating oil pumps are built-in at the flywheel end of the engine. A shaft extension is provided forward for power take-off. Refinements such as these have been accomplished without adding complications.

To emphasize the many improvements that have been made available over a period of years to its 2-cycle 10 x 12½ Model 35 marine diesel engines, this builder has summarized the resulting improved fuel consumptions in the graph reproduced herewith.



Fairbanks-Morse announces recent sale and installation of five of these new 320-hp Model 35 engines. Two of these installations are for East Coast fishing vessels, the other three being for West Coast service. A 90-foot combination purse seiner and tuna boat, building at Harbor Boat Works, Terminal Harbor, is to be powered with this engine, as is a 96-foot purse seiner, building at Martinolich Shipyard at San Francisco, and a large tugboat operating on the Oregon Coast.